FEDERATION OF RHODESIA AND NYASALAND

ANNUAL REPORT

of the

SECRETARY TO THE FEDERAL MINISTRY OF AGRICULTURE

which includes

THE DEPARTMENT OF RESEARCH AND SPECIALIST SERVICES, CONSERVATION AND EXTENSION SERVICES AND VETERINARY SERVICES

for the year ended 30th September, 1954

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N. E. Brooks, Secretary to the Federal Ministry of Agriculture.

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N. E. Brooks, Secretary for Agriculture.

I.—INTRODUCTION

The form of this Report differs from that in previous years in that it includes the full reports of the Heads of the Departments making up this Ministry. By this means a full review of the activities of this Ministry will be contained within one cover and not in separate publications as in the past.

The season 1953/54 was a good one throughout Southern Rhodesia, apart from the Eastern districts where late and erratic rains made crop production more difficult than in normal seasons. That conditions were favourable for most of the country is evidenced by record crops of maize and tobacco and increased production of milk. Tobacco sold over the Auction Floors in 1954 reached an all-time record of 120,000,000 lb. weight and maize production is also expected to reach the highest figure yet of 2,870,000 bags. The slaughtering of stock more than maintained previous levels and supplies of milk increased substantially.

These good yields ensured a satisfactory season for the agricultural industry. The general public usually gives credit for a good season to the rainfall and because this is such a decisive factor in production the improvement in farming methods which has taken place over the last few years is apt to be overlooked. The improvement in yield is not due to Nature only; a large proportion of the increased yield has been brought about by better farming systems and scientific practices. The majority of farmers now accept with little question the principles underlying the Natural Resources Act which have been so assiduously disseminated by the Natural Resources Board and the Department of Conservation and Extension and are fully aware that the maintenance and the increase of the level of production can only be brought about by the continued application of these principles to their farming systems.

Progress has also been made in the animal husbandry field. Due to the season, grazing conditions were favourable and livestock production was maintained and improved in a satisfactory manner. Here again some of this improvement is attributable to the greater attention being given to veld management problems by our cattle men. Further improvement, however, can be obtained by additional fencing and the provision of more water supplies and it is pleasing to be able to record that farmers are very conscious of these needs and are doing their best to supply them.

The period under review has seen a continuation of the easier conditions in the general economic climate of both the world and Southern Rhodesia noted in my last Report. Economic activity everywhere has continued at a high level, and with many of the onerous war-time controls and other dislocations of the post-war period gradually disappearing there has been a general tendency for world commodity costs to continue downwards and for the prices of many farm requisites to ease. In Southern Rhodesia these have, to some measure, been offset by further rises in railway rates and by a continued upward tendency in Native wages, but on balance farm costs have remained steady. This factor, combined with the effects of a third favourable season, resulting in the reaping of a bumper maize crop and its sale at continued satisfactory prices, together with the marketing of stock in excellent condition throughout the year, has meant a year of farming prosperity for most of the industry.

The attainment of this sound position is due, in no small degree, to the Government stabilization of agricultural prices, which has been one of the most important economic developments in Southern Rhodesia over the past ten years. In its simplest form it has the effect of mitigating heavy price fluctuations due to surplus or deficit production and it may be planned and operated solely for that purpose. The producer benefits first, because his production can be geared to a set pace, and carefully planned, for price stabilization removes the stimulus to unhealthy expansion and prevents sharp contraction. The result is that over the long term production is cheaper. In the second place, the producer benefits because stabilization gives him a better average than he would obtain under a fluctuating market. The consumer benefits because of a more assured supply with less likelihood of shortages or of gluts, and because he too is protected against the effects of fluctuating prices that he would suffer under normal conditions.

II.—ADMINISTRATIVE SERVICES

General

With effect from the 1st April, 1954, European Agriculture in Southern Rhodesia was placed under the control of the Government of the Federation of Rhodesia and Nyasaland. This change of control was preceded by much administrative activity in the way of preparation of legal notices, orders, etc. which had to be ready for publication on the above date so that the functions of the Ministry could be carried on under due legal authority. That this changeover was effected with the minimum amount of fuss and confusion is due in large measure to the staff of this Ministry who worked long hours in a manner which is deserving of the highest praise; and I take this opportunity of thanking them for the keenness, energy and loyalty displayed in completing this somewhat complicated task.

As the functions of the Departments of Irrigation, Lands, Forestry and Surveys, which were formerly within the Southern Rhodesia Division of Agriculture, do not come under the control of the Federal Government, these Departments remain the responsibility of the Southern Rhodesia Government and do not now form part of this Ministry. At this parting of the ways I tender my thanks to the Heads and Staff of those Departments for their loyalty and co-operation while in the old Southern Rhodesia Division of Agriculture. The closest co-operation with these Departments will still be necessary to ensure the smooth functioning of Agricultural Services in Southern Rhodesia and I am confident that there will be nothing lacking in this respect.

Shortly after the advent of Federation an Interterritorial Working Party was set up by the Office of the Federal Prime Minister with the following terms of reference:—

(*a*) to advise on the practicability of making European Agriculture and Animal Health in Northern Rhodesia Federal subjects, and if practical to recommend on the steps which should be taken to put that into effect;

(*b*) to consider questions relating to the co-ordination of inter-territorial agricultural policy;

(*c*) to consider and advise on specific problems referred to the Working Party.

The Secretary for Agriculture (*Chairman*) and the Chief Agricultural Economist of this Ministry served on this Working Party, the other members being the Directors of Agriculture and Veterinary Services, Northern Rhodesia, the Financial Secretary and the Director of Agriculture, Nyasaland.

Although, at the end of the period under review, the Working Party had not completed its final Report it had submitted an Interim report, as a result of which two important Federal Committees were established—an *ad hoc* Committee charged with investigating cattle and beef marketing in the Federation and a Standing Committee on Prices and Markets. The other recommendations of the Working Party are still receiving the consideration of the Governments concerned.

Agricultural Economics and Marketing

The work of the Agricultural Economics Branch has been interfered with to some considerable extent, owing to numerous additional duties placed on the staff as a result of Federation such as membership of various Federal Committees and the administration of Federal import and export control of agricultural commodities. It is hoped that the position will be relieved by the appointment of an additional Economist in the near future. Work has continued on the Agro-economic survey and the field work is almost completed. The writing up of the report will, however, take some considerable time.

The third year of the cattle cost enquiry has been completed but the results have yet to be put into report form. Work continues on the milk costs enquiry, now in its third and last year and it is still producing valuable material and attracting the interest of farmers. The enquiry into the cost of maize production, as required under the terms of the Government's agreement with the Rhodesia National Farmers' Union, has been instituted in Southern Rhodesia and a similar enquiry is being undertaken in Northern Rhodesia.

The Agricultural Marketing Council has continued to function well throughout 1953/54 and its close liaison with the Economics and Marketing Branch has been maintained. A member of the branch has served as Secretary to the Council and the Chief Agricultural Economist has attended all but one of its meetings in an advisory capacity. The necessity for this close link between this branch and the Council has proved itself and the system is working well.

The Branch has continued to be responsible for the Co-operative movement. The Registrar has been unable to give much attention to this movement during the year in the face of pre-occupation with other duties but is now pressing his previous

proposals for extensive and very necessary amendments to the existing Co-operative Companies Act. The Northern territories have been approached with a request to consider overall Federal legislation in this regard. Throughout the year the Branch has provided a steady volume of information on the economics and marketing and on the production and processing of agricultural products throughout the Federation and in respect of various parts of the world.

The Chief Agricultural Economist has attended all meetings of the Cold Storage Commission and of the Grain Marketing Board and has had a representative at all meetings of the Dairy Marketing Board. He has served as a permanent member of the Tariff Advisory Committee and of the Railway Planning Committee. He has been closely associated with the primary trade negotiations with the Union of South Africa and is a member of the Government's negotiating team for all trade agreements. He is a member of the Tariff Committee appointed to finalise the proposals for the introduction of a Federal Tariff.

Rhodesia Agricultural Journal and Library

The Journal is issued every second month and at present the number printed is 2,000 per issue. This office receives the Journal subscriptions and distributes inter-departmental journals and bulletins, as well as exchange bulletins throughout the world. The local sale of bulletins to the public is, however, now the responsibility of the Publications Section of the Government Stationery Office.

In the Library the usual routine work of indexing, cataloguing and distribution of literature was continued. A 1953 Supplement to the list of books in the Department of Agriculture was compiled and copies sent to the various branches. In addition a list was compiled of scientific literature filed in the various departments including Agriculture, Geological Survey and Public Health. Copies of the list have been distributed.

The Librarian continued to act as Secretary of the Divisional Library Committee and was responsible for the transmission of book requisitions and for the checking and distribution of book orders on arrival.

Maize

Although the 1953 harvest proved to be somewhat below the output for the previous year (2,360,000 bags as against 2,454,047) the output was very satisfactory and again proved adequate to the needs of the territory. The acreage planted to maize by Europeans rose from 361,024 acres in 1951/52 to 363,204 acres in 1952/53 and resulted in an average yield of 6.5 bags per acre as compared with 6.80 bags in the previous year. Deliveries of maize up to the end of September, 1954, have been very good indeed, notwithstanding the serious rail crisis which developed towards the end of the marketing season and which has acted as a brake on deliveries over a period of several weeks. The main impact of the rail crisis, however, has resulted in the inability of the Grain Marketing Board to keep all maize under cover according to its previously planned programme, but at the end of September the position was, considering all the difficulties, very satisfactory, with somewhat less than 100,000 bags still exposed. The record crop of 1952 has already been substantially exceeded by 1954 deliveries and it is estimated that the European crop will reach 2,870,000 bags. The estimated acreage planted is 384,000 acres giving a yield of 7.2 bags per acre.

Although responsibility has not yet been taken over for Federal grain marketing, the senior Staff of this Ministry have been deeply engaged in preparing the way for the assumption of this responsibility. At the present time the overall maize supply position of the Federation is very satisfactory, with Southern and Northern Rhodesia both having sufficient supplies in covered storage to secure approximately one half of the year's consumption and with Nyasaland having a material surplus for export amounting this year to approximately 45,000 tons.

The demand for hybrid maize seed has increased considerably, particularly from Northern Rhodesia. A hybrid maize farm is urgently required as the present system whereby single hybrids are produced and inbreds bulked at Gwebi College Farm and Henderson Research Station is far from satisfactory.

Small Grains—Kaffir corn and Munga

The beginning of the year saw the Grain Marketing Board seriously embarrassed with accumulated stocks of kaffir-corn and munga of which the kaffir-corn stocks were highly susceptible to insect attack and were known, in any case, to be of poor quality. Attempts to place these grains in consumption at prices commensurate with their purchase prices (fixed at parity with maize) failed, and in the event both had to be offered to the trade under considerable subsidy, amounting to 15*s*–6*d* on kaffir-corn and 11*s* a bag on munga. At these prices the accumulated stocks of kaffir-corn were rapidly cleared, and the year has ended with the Grain Marketing Board in a difficult position with regard to this crop as a result of the almost complete failure of the 1953/54 harvest of kaffir-corn. Stocks of munga continue to run at approximately two years' supply, but there were indications towards the end of the year that these stocks were moving with increasing momentum under the influence of the subsidy noted above, and in the face of the exhaustion of kaffir-corn supplies.

Wheat

Very little improvement in the production of this crop can be recorded. The total harvested in 1953 from both the summer and winter crops was 8,208 bags from 2,160 acres. The summer wheat trials have not been a success but investigations are going on with a view to establishing suitable systems of soil and crop management for the production of winter wheat in vleis. Some good crops of irrigated wheat have been grown but the number of these is not large enough to materially increase overall production.

Groundnuts

The position here continues to be unsatisfactory. During the year European producers have produced less than 60,000 bags for market and their output remains confined almost entirely to crop rotation and farm requirements. The price was reduced materially to 70*s* for the 1953/54 harvest and has been disposed of almost exclusively to local oil expressors.

Potatoes

At the beginning of the year considerable apprehension was felt as to whether potato production would be adequate, in the face of the previous year's disaster and the rising costs of production due to the necessity for spraying against blight attack. Publicity was therefore given to the need for expanding potato production in new and previously unaffected areas. The result was a considerable increase in the output of the late irrigated crop coming on to the market in September and October with consequent glut, re-emphasizing the well known fact that the margin between shortage and glut in this commodity is slender indeed. This in its turn has a psychological effect upon the planting of the main crop and supplies ran short between the final

lifting of that crop and the appearance on the market of the early irrigated supplies. Thus for a period of six weeks the Colony was completely dependent on imported supplies, fortunately at low cost. This situation repeated itself during the month of September. The Government's policy has been to continue to maintain guaranteed prices and preliminary consideration has been given at the level of the Agricultural Marketing Council to proposals for the introduction of a Potato Marketing Scheme.

Tobacco

For the second year in succession, production of tobacco in Southern Rhodesia struck an all-time record, although again the crop contained a very high proportion of nondescript types (23.7 per cent.). Notwithstanding this fact, however, a great deal of much better tobacco was produced—heavier bodied, more oily and highly spoken of by the United Kingdom purchasers. During the year there were 2,632 growers of Virginia type tobacco, of whom 271 were new, as against 2,563 growers in the previous year. There was a continued fall away, however, in the number of persons interested in Turkish tobacco. The number of registered growers for the year fell from 451 European growers to 408, of whom 131 were new. An interesting development, however, was the entry into this industry of 95 African growers under the auspices of the Southern Rhodesian Department of Native Affairs.

The yield of tobacco harvested during the season was approximately 120,252,000 lbs. of flue-cured tobacco as compared with 106,000,000 lbs. in 1952/53. Not only was this a new record, but it was considerably in excess of the most optimistic crop forecasts. The fire-cured Virginia crop in Southern Rhodesia reached 598,060 lbs., an increase of 140,000 lbs. on the previous year. Production of Turkish tobacco in Southern Rhodesia remained fairly stable.

Sales of flue-cured Virginia tobacco amounting to 120,251,036 lbs. resulted in a total realization of £19,212,655–18*s*–2*d*, an increase of nearly £2,000,000 on the previous year. In the face of the higher proportion of nondescript tobaccos, however, and in line with the general easing of world commodity prices, the average price of tobacco sold fell from 39.70*d* in 1953 to 38.35*d* in 1954.

Sales of North Western Rhodesian flue-cured Virginia tobacco amounted to 5,176,089 lbs. at an average price of 34.88*d* per lb. or a total value of £752,206–17*s*–7*d*. Sales of North Eastern Rhodesia flue-cured Virginia tobacco amounted to 2,809,051 lbs. at an average price of 27.47*d* per lb. or a total realization of £321,477–8*s*–4*d*.

All of these tobaccos were sold over the Salisbury Auction Floors.

The advent of Federation had a serious effect upon the market for dark fire-cured tobacco in Southern Rhodesia. The abandoning of restrictions on inter-territorial trade with effect from the 1st April, 1954, resulted in a serious weakening of this market previously protected to the extent of local requirements by both import controls and protective duties. The weight of fire-cured tobacco sold was 598,060 lbs. at an average price of 10.69*d* per lb. as opposed to an average price of 16.76*d* in the previous year. Because Government action was taken to free tobacco traffic after the planting of this crop and without warning to the growers, Government has agreed to make up the difference between 10.69*d* and 16*d* per lb. to producers by way of subsidy.

Notwithstanding the heavy increase in production, the United Kingdom has once again been unable to secure its requirements from the Southern Rhodesian crop in the traditional United Kingdom grades, and competition for good quality tobaccos has been keen. The market has again been well supported by continental markets which have increased their purchases, though quantitatively the percentage has fallen from the high level achieved 12 months ago. Comparative figures in respect of destination of purchases are set out below:—

Destination	1952/53 *Crop*	1953/54 *Crop*
United Kingdom	56.48%	57.93%
Australia	7.92%	8.36%
Local	5.68%	5.68%
Other markets	29.78%	28.00%
Unallocated	.14%	.03%

The Tobacco Research Board has done sterling work and the extent to which this has been put into application by the producers is shown by the heavy yield of the 1953/54 crop, and by the good proportion of heavier bodied tobacco already referred to. Nevertheless, the shortage of these tobaccos relative to demand cannot be over emphasized, and further efforts must be made to reduce the high proportion of nondescript. At the present time the Southern Rhodesian position appears to be adequately safeguarded under the existing agreement with the United Kingdom, but it is important to note that in no year since the institution of this agreement has Southern Rhodesia ever been able to satisfy the United Kingdom's requirements. Whilst it is true that heavy investments have been made in Central Africa by British manufacturers and that one cannot visualize any reluctance to continue to buy

Rhodesian tobacco, nevertheless the position of tobacco as a contributor to the national revenue of the United Kingdom is so important that unless production can be brought nearer to the United Kingdom demand this area may not be favourably treated in the event of complete convertibility of sterling. At present United Kingdom importers are restricted to purchasing 61 per cent. of their requirements from dollar sources; the sanction for this restriction lies exclusively in exchange control regulations, and in the face of convertibility being re-established, our tobacco will only retain its place on the basis of a continued improvement in both quantity and quality.

Cotton

There continues to be little interest on the part of the European producer in the cotton crop. The incidence of stainer in such crops as have been produced has been high, and the peculiar nature of last year's rainy season has combined poor cotton with low yield crops. This, together with falling prices, has resulted in a considerable loss of confidence in the cotton crop on the part of European producers. During the year the Federal Government has passed legislation dealing with cotton marketing, which takes over the existing Cotton Research and Industry Board in Southern Rhodesia, and assumes Federal responsibility for all price and marketing arrangements. This legislation had not been promulgated at the date of this Report.

Fruit and Vegetables

This was a variable year for horticulture. Excess rains in Mashonaland seriously affected vegetable crops, whereas in the Eastern Districts a low rainfall limited water supplies for irrigation. There were severe frosts in late July, causing heavy damage to indigenous trees.

Fruit and vegetable production continued to expand but nonetheless local production failed to meet requirements, and the value of imports also increased.

Starting in October, 1953, the Ministry issued biweekly reports on market conditions. These stated briefly the supply position, prices and qualities for the principal markets, and were published in the Press and also broadcast.

Attempts have been made by growers in the Eastern Districts to organize the fruit and vegetable industry. This move has the support of the Rhodesia National Farmers' Union, and there is every indication that useful schemes will emerge.

Production of citrus fruits continued to increase, and the demand for orange and naartje trees outstripped local supplies. There are a large number of trees not yet bearing that will, within the next few years, lead to a considerable increase in production.

There were continued plantings of deciduous and other fruit trees, and among the larger growers the number of trees not yet bearing greatly exceeds those already bearing.

Experience is being gained in the growing of pineapples and bananas on a commercial scale. More chambers for the ripening of bananas have been built at Salisbury and at Bulawayo, resulting in an improvement of the fruit, and increased trade. Excellent avocado pears were produced, and sold well.

A steady recurring increase in vegetable production continued. The recorded acreage of the larger growers for 1953 was 3,792 (*c.f.* 3,335 in 1952) with a yield of 10,178 tons.

Much of the production is still of a haphazard nature, although in Umtali and adjacent areas a more stabilized industry has been built up through quota production for processing. Salisbury and Bulawayo experienced a vegetable shortage during the summer, due to heavy rain and disease. It is felt that better cultural conditions, timing of sowings and protection measures could do much to reduce losses during bad weather.

The building of glass houses and frames in the Salisbury area as a pilot scheme shows a new approach to vegetable growing in this country. Tomatoes and cucumbers did well, but the scheme is still in too early a stage of development to comment on the economic possibilities of its further expansion.

Dairying

The total production of milk in Southern Rhodesia during the year ended 30th September, 1954, reached the total of 11,850,000 gallons, which is a record, being 800,000 gallons greater than the previous year's production, which was itself a record. The pattern of the industry continues to follow the same trend as in recent years which is that the increase is mainly in the output of liquid milk.

Butter production this year totalled approximately 906,000 lbs. a decrease of approximately 60,000 lbs. on last year while during the same period 2,519,000 lbs. were imported against the previous year's figure of 2,413,000 lbs. From these figures it is clear that there is no sign as yet of any possibility of reducing the quantity of butter imported to meet consumption demands.

Cheese production reached a record total of 1,002,000 lbs. as compared with 608,000 approximately in 1952/53, whereas importations amounted to 550,870 lbs. Production is therefore catching up with consumption and, if the present trend continues, Southern Rhodesia will be self sufficient in cheese in the very near future.

The Dairy Marketing Board Scheme has now been operative for two full years, and the Board has taken over, in addition to the Salisbury and Gatooma Dairies, absorbed during its first year's operation, the entire organization of the former Rhodesia Co-operative Creameries (1936) Ltd., Bulawayo. This has included, not only the Bulawayo Butter Factory, but also the milk processing plants at Gwelo and at Que Que. Both these latter units were in a serious condition and although the Butter Factory has made good profits, and thereby contributed to the finances of the Board, the two milk depots have been a constant drain.

Beef Cattle

During the course of the annual review of agricultural prices held in January and February, 1954, the most careful consideration had to be given to the proven claims of cattle farmers that their costs of production had, over the previous 12 months, risen by approximately 3 per cent. The prevailing atmosphere at the time of the negotiations was, however, one of sharp consumer resistance and the position was further complicated by the known fact that the Cold Storage Commission had made serious losses over the 12 months ending 31st December. It was obvious that this difficult position would have to be set right by an adjustment in consumer prices of beef and, in the face of this situation, it was decided that it would not be possible to pass on to the producer of cattle the increase in prices which, under other circumstances, might have been justified. Notwithstanding the fact that no actual increases in the published prices took place, however, the cumulative effect of three good seasons has resulted in a higher proportion of better finished and higher grade cattle coming on to the market, with the result that the overall average payout to producers increased substantially over that in the previous year.

One of the disturbing factors in the meat situation is the continued excess of prime beef in relation to the Colony's consumer requirements. Whereas the public continues to be rationed in respect of its supplies of ration meat to the levels operative in June, 1954, the territory's policy of paying incentive prices for top grades of cattle has resulted in a surplus of beef derived from these cattle. During the period under review the Cold Storage Commission of Southern Rhodesia has been obliged to export this surplus to various markets as shown below:—

Belgian Congo	1,366,752	lbs.
Northern Rhodesia	648,498	„
Germany	2,790,555	„
Italy	663,834	„
United Kingdom	24,762	„
South Africa	996,592	„
Czechoslovakia	1,301,246	„
Nyasaland	4,846	„
TOTAL ..	7,797,085	lbs.

Pigs

During the year the expansion of the pig industry has continued on a rapid basis and this expansion, although met by the opening of the Federal market for bacon and fresh pork, has not been matched by the absorbtive capacity of the export market for canned hams, gammons and other pig products. Indeed at the end of the year under Report, Southern Rhodesia's export organization had 12,118 cases of hams and gammons and 10,985 cases of pork luncheon meat awaiting sale in the United Kingdom under price conditions which, if sales had been forthcoming, would have resulted in serious loss. In the face of these circumstances much consideration has been given to the need for reorganization of the pig industry, which at the present time, is subject to a multiplicity of controls and deeply divided counsels. For example, the grading and overall control is in the hands of the Pig Industry Board but this body's price responsibility now appears to be conferred upon the Agricultural Marketing

Council in terms of the Agricultural Marketing Act. Most European pigs and a high proportion of African pigs produced for sale are the property of the National Pig Breeders' Co-operative Ltd. but this is a purely paper organization using as its processing and handling agent the Cold Storage Commission. Neither of these four important bodies is directly represented on any of the others. The Department of Native Affairs and the Rhodesia National Farmers' Union, as well as this Ministry are all interested parties intervening from time to time in the affairs of the pig industry. All attempts to secure reasonable arrangements for the future of the industry have so far failed, but consultations are continuing. It is vitally important to the Federal area that it should be self-sufficient in respect of its own bacon requirements, and it is only just in this position at the present time with the existing output of pigs. The local pig market is worth £2,000,000 a year to the Federation and as such is well worthy of Government support and backing.

Poultry and Eggs

During the early part of the year the poultry industry was bolstered by the operation of a Government support price in respect of surplus eggs; a support which was not discontinued until the middle of February, 1954. The institution of the guarantee was based on the assumption of normal supplies. In view of the peculiar nature of the rains, however, the anticipated shortage, normally apparent from mid-October onwards, did not develop and the Cold Storage Commission was obliged to take in unprecedented supplies of surplus eggs for pulping. A large proportion of these supplies continue to be a drug on the market. Faced with the prospect of considerable loss, the Government was unable to continue to extend the guarantee to 1954 production even at a lower price basis with the consequence that the second half of the year under report has seen a difficult position in the poultry industry. Production extended materially under the stimulus of Government guarantee, and since the beginning of May the Colony has been flooded with surplus supplies of eggs at extremely low prices. Demands by groups of producers to introduce orderly marketing schemes have been resisted by the Government on the grounds that the industry is not sufficiently organized to attract State intervention, but nevertheless, some measure of control seems necessary and consideration may be given in the near future to the re-introduction of the proposals for the simple marketing scheme which was attempted just over a year ago.

V—RESEARCH AND SPECIALIST SERVICES

R. McChlery—Director of Research and Specialist Services

General

It is always difficult to assess the benefits of a research department. Its results are seldom spectacular and are to be found in the gradual improvement of the standard of farming. Rhodesia is fortunate in its farmers who are quick to apply new knowledge. This Department, therefore, while being conscious of the enormous field to be covered, must be alive to the main problems affecting agriculture in this country. A study of this Report will show the wide range of investigations in progress. It will show, too, the collaboration between workers in various fields towards a balanced agriculture with the accent on increased food production.

The marked interest in improved pastures has resulted in the formation of the Southern Rhodesia Pasture Seeds Association, in the establishment of which officers of this Department played a leading part. A Seed Potato Association has also been set up in the Eastern Districts and the Department is giving every assistance in its development.

With the very great expansion in progress in the country it is inevitable that numerous departmental and inter-departmental committees and boards should be appointed. These have taken up a considerable amount of the time of senior members of the Department.

AGRO-ECONOMIC SURVEY

Mention of this survey was made in last year's Report. The field work in connection with the agro-ecological and soils aspects of the survey were completed during the year. The Colony has now been divided, with reasonable accuracy, into five natural farming regions based on the efficiency of the rainfall and taking into account total annual precipitation, temperatures, incidence of droughts and soils. This division will provide invaluable guidance for the development of sound farming systems for the different regions.

On the economic side it is anticipated that the collection of data in the field will be practically completed before the end of 1954. It is hoped the final report on the survey will be completed ready for publication late in 1955. The sections dealing with the agro-ecology of the country and on the soils are already nearing completion. Pressure of work in the Surveyor General's Department may cause some delay in the preparation of the maps to go with the published Report. These maps, however, will be an essential part of the Report as much of the information can best, or only, be presented in this way.

ANIMAL HUSBANDRY

The year under review was very favourable for livestock production. Rainfall was adequate and fairly well distributed. Cattle maintained good condition during the dry season.

The Cattle Industry

Below are given figures for European-owned livestock over the last five years.

Year	*Total number*	*No. of cows*	*No. of calves*	*Total deaths*
1949 ..	1,188,101	350,514	199,439	93,069
1950 ..	1,148,712	332,769	166,572	87,123
1951 ..	1,154,860	328,088	178,088	56,055
1952 ..	1,199,576	348,755	188,815	54,715
1953 ..	1,196,570	363,681	192,778	62,486

A slight decrease was recorded in the European-owned cattle at the end of 1953. Breeding cows and calves again showed an encouraging increase. Deaths increased slightly but still remained well below the bad seasons 1949 and 1950.

A close examination of the cattle statistics seem to indicate that the rate of reproduction has not kept pace with the increased rate of slaughtering and this situation is resulting in a position in which any startling increase in the cattle population cannot be expected unless a very substantial increase in calving percentages can be achieved.

The problem of the low reproduction rate in beef cattle is under active investigation at two of the research stations. Unfortunately, all methods to increase production must lead to an overall improvement in the quality of beef produced, while the demand for beef is essentially for the lower grades to feed the growing lower income groups. The difficulty of reconciling the nature of the demand with increased production remains a major problem in the industry.

Supplies of Slaughter Stock

The following table indicates the supplies of slaughter stock and the average cold dressed weight of cattle over the past five years.

Year	*Total number of cattle slaughtered*	*average c.d.w.*
1949	174,408 ..	446
1950	200,458 ..	415
1951	234,105 ..	415
1952	238,755 ..	413
1953	227,923 ..	423

A small decrease took place in the total number of cattle killed in 1953, but a slight increase in c.d.w. was recorded. Supplies were well maintained during the 1954 dry season and at the end of September indications were that with rain arriving in time rationing of beef may be entirely avoided.

It is gratifying to report that a very great improvement has taken place in all aspects of handling beef, resulting in the marketing of a much more attractive article for the consumer.

Prices of Slaughter Stock

No increase in the price of slaughter stock was made during the year. The weight bonus which used to apply in respect of Imperial, A Grade and G.A.Q. grade was abolished and an equivalent amount consolidated into the price of these grades. In the case of Rhodesia Best Grade the weight bonus was changed into a Youth Bonus to encourage the feeding of younger steers. On all two-tooth cattle graded Rhodesia's Best an additional payment of 20*s* per 100 lbs. was made, and on all four-tooth cattle graded Rhodesia's Best an additional payment of 10*s* per 100 lbs. was made. In order to assist in the better distribution of supplies prices were varied at weekly instead of monthly intervals.

Grading of Beef for local consumption

Grading of beef and pigs was carried out at Bulawayo, Salisbury, Fort Victoria, Umtali, Gwelo and Gatooma, and the number of cattle in the various grades and classes were as follows:—

Grade	*Oxen*	*Cows*	*Bulls*	*Tollies*	*Calves*	1954 *Total*	1953 *Total*
Rhodesia Best	3,129	114	—	—	—	3,243	1,631
Imperial ..	17,189	336	—	—	—	17,525	14,613
Standard A ..	40,422	1,573	—	—	—	41,995	55,401
G.A.Q. ..	30,547	15,544	—	—	—	46,091	44,485
F.A.Q. ..	11,246	6,847	—	—	—	18,093	16,960
Compound ..	12,771	11,281	3,011	—	—	27,063	22,802
Inferior ..	2,610	7,330	173	—	—	10,113	7,817
Tollies ..	—	—	—	132	—	132	269
Calves ..	—	—	—	—	2,908	2,908	4,233
TOTAL ..	117,914	43,025	3,184	132	2,908	167,163	168,211

For comparative purposes the grades obtained in 1953 are given in the last column. This indicates a sharp increase in the Rhodesia Best grade which can be attributed essentially to the effect of the Youth Bonus Scheme, that resulted in the feeding of steers at a young age. As a grade, Rhodesia Best still represents only 2 per cent. of the total number. A substantial increase was also recorded in the Imperial Grade with a marked reduction in Standard A.

As a result of certain difficulties experienced in disposing of the higher grades of beef as well as a desire to prevent an inevitable increase in the price of choice beef, producer grades of beef were regrouped into two classes instead of three for the retail trade. The retail grades came into operation on 1st April and are indicated below:—

Producer Grades		*Retail Consumer Grades*
Rhodesia Best Imperial Grade A	.. ..	Prime beef roller marked Choice
20% G.A.Q.	.. ..	Best G.A.Q. selected for prime grade
80% G.A.Q. F.A.Q. Compound Inferior	.. ..	Grade 2 beef unmarked

The demand for breeding stock remained firm. A new scheme was introduced by the Cold Storage Commission, which allowed for female stock purchased in native reserves to be placed as graziers under agreement in the same way as steers. The scheme was welcomed by farmers and provided an easy means of increasing breeding stocks.

Stall Feeding of Cattle

Smaller numbers of cattle were stall-fed during the year, mainly because of a change over in the demand for younger animals, which could qualify for the Youth Bonus instead of older steers on which smaller returns can be expected, after the abolition of the weight bonus. The selection and feeding of younger animals requires more skill and a longer feeding period, in order to qualify for the higher grades.

Cattle Slaughter Control Order

Careful records kept at the main centres indicated that 1,910 immature steers and 797 suitable breeding stock were killed compared with 2,159 steers and 778 breeding stock during the previous year. The relaxation of these regulations has not resulted in any increased slaughtering of this type of stock and their abolition during the year was justified.

Dairy.

The demand for dairy stock remains well in excess of the supply. No increase in the quota for dairy stock from the Union was obtained.

The following tables give the number of pigs owned and slaughtered during the past five years:—

NUMBER OF PIGS OWNED AND SLAUGHTERED

Year	*Pigs owned*	*Pigs slaughtered*
1949	37,155	39,155
1950	43,258	54,068
1951	48,987	62,908
1952	64,015	77,968
1953	74,113	106,088

Further expansion has taken place in the Pig Industry. Prolonged discussions between the different interested parties on the future of the pig industry took place but did not reach any finality. Fluctuations on the overseas market added to the confusion, and the industry ended the year in a rather uncertain state.

Grading of Pigs

A total number of 117,151 pigs were graded during the year at all grading centres, divided into the following grades and classes.

Baconers	*Number*	*Porkers*	*Number*	*Larders*	*Number*
Grade A	31,554	Grade A	35,624	Grade A	4,602
„ A2	3,459	„ B	5,447	„ X	720
„ B	6,228	„ X	16,214	—	—
„ C	1,982	Inferior	7,426	—	—
„ X	3,895	—	—	—	—
TOTALS	47,118		64,711		5,322

Although the total number of pigs slaughtered at the different grading centres increased from 94,212 in the previous year to 117,151 in 1954, the number of baconers actually decreased from 50,221 to 47,118 while porkers reached the high peak of 64,711 compared with 40,675 in 1953. This indicated a definite preference for porker production, probably due to the more exacting grading system used for baconers, which makes it more difficult to obtain the higher grades. Recommendations for improvements in the grading system were made, but could not be introduced owing to lack of agreement between different interests in the industry.

The following schedule of prices and grades remained in force during the year.

Baconers		*Porkers*		*Larkers*	
Grade	*Prices per lb. C.D.W.*	*Grade*	*Prices per lb. C.D.W.*	*Grade*	*Prices per lb. C.D.W.*
A	1*s*– 8½*d*	A	1*s*–7*d*	A	11*d*
A2	1*s*– 7*d*	B	1*s*–6*d*	X	7*d*
B	1*s*– 6*d*	X	1*s*–0*d*		—
C	1*s*– 3*d*	Inferior	7*d*		—
X	11*d*	—	—		—

SHEEP

The following table gives the number of sheep owned and slaughtered as well as the mortality in sheep over the past five years.

Year	*Sheep owned*	*Sheep slaughtered*	*Deaths*
1949	108,064	48,535	10,592
1950	105,266	38,548	11,415
1951	116,056	49,914	10,247
1952	115,588	54,021	20,698
1953	105,970	52,308	17,444

Sheep numbers showed a decline, although several producers were keen to try out new types and breeds, with better mutton qualities. Both German Merino and Dorper sheep were imported during the year. Small quantities of lamb obtained from New Zealand had a very good reception from consumers.

General

Increased interest in livestock production was reflected in the demand for numerous visits to farms in co-operation with Extension Officers to advise on specific animal problems. A clear desire was expressed by producers for close co-operation with the Department in matters of livestock research.

Poultry

Supplies of eggs greatly increased during the year and lower prices prevailed. This was accentuated by the absence of any organized purchasing and storage arrangements and by the heavy stocks of pulp carried over from the previous season. There were some sales of eggs to urban Africans in many centres during the flush season and might prove to be a profitable market for cheap surplus eggs.

There was a steady demand for table poultry and prices were not depressed although production had greatly increased. The quality of table birds improved and with adequate storage facilities there is a good prospect of building up local sales and export to substantial proportions.

Exports of day-old chicks to the Northern members of the Federation and other African territories were maintained.

Numbers of Birds and Sale of Produce

The number of poultry increased by 24 per cent. to a record figure. Eggs sold also increased, the value being £281,081. Day-old chicks sold numbered 540,683 valued at £44,768. Table birds sold increased to 510,975 lbs. valued at £60,495. Together with the sale of breeding stock the total value of these products was £392,736. These figures are returns from 3,405 poultry producers but do not represent the whole industry.

Feeds

All feeds for poultry have been freely available at prices slightly lower than 1952. Sorghum grain was used to replace a proportion of maize in mixed feeds.

Experimental

Gwebi Agricultural College

The Thirty-Fourth Annual Southern Rhodesia Egg Laying Test concluded on January 30th, and a full report was published in the March/April, 1954, issue of the *Rhodesia Agricultural Journal*. Production was maintained at the high average of recent years but the mortality of 18 per cent. was the highest recorded. This is not considered significant in one year only. The Thirty-Fifth Annual Test started on the 1st March, all pens being filled. It is anticipated construction of further pens will commence shortly.

The Station flocks were maintained and the improved breeding programme continued. Records show definite improved qualities in various breeds. White Leghorns showed improved production and lack of winter pause; Rhode Island Reds improvement in incidence of leaucosis; and Black Australops improved family records and breeding qualities. This work is a continual process of breeding for improvement. Larger flocks are necessary to be able to do this more effectively.

The flocks of Broad Breasted Bronze and Beltsville Small White Turkeys have been very successful. Breeding toms and hatching eggs from this improved stock have been sold to farmers.

The following trials have been conducted:—

1. *Layers in Cages* (Battery system): this trial is now completing its third year and a report will be issued shortly. Results this year have been excellent and a sustained production of 70 per cent. has been maintained. Local climatic conditions are ideally suited to open air caged layers.

2. *Sorghum feeding trials:* these have just commenced with a view to ascertaining the value of local sorghum and munga as substitutes for maize in chicken rations.

3. *Fold Units on Star Grass:* the keeping of layers in fold units on star pasture has been combined with production trials of various first crosses. These trials were completed on September 30th and a report will shortly be available. The system proved very successful for egg production. The White Leghorn × Black Australorp cross gave the highest production.

4. *Management of Litter:* studies in the management of litter for chickens and layers under local conditions were made. Deep litter in laying houses can be successfully used for at least two years. Excess moisture is no problem here. It is necessary to sprinkle new litter with water in the dry season to prevent dust and promote breakdown in the litter, especially if the floor is impervious. Brooder chickens on built up litter did not develop coccidiosis when ten batches were run over the same litter, though it was experienced in these houses the previous year when litter was changed with each batch. No internal parasitic infestation in chickens or adults was noticeable.

Building construction completed consisted of six permanent rearing houses, 14 steel folds, and one turkey range shelter. An overhead irrigated plot for green food was established.

The native poultry on the farm was found to be heavily infected with fowl typhoid. The owners were given time to slaughter all birds and further re-stocking has been prohibited.

Eggs and table poultry were supplied to the College Hostel and Staff and also the General Hospital. Stud cockerels, turkey toms and hatching eggs were sold to farmers. The total revenue was £2,200.

A programme of 30 lectures and practical instruction was given to junior students throughout the year.

Matopos Research Station

The block of laying houses was completed in time to house the 1953 hatched pullets. Four large rearing camps were fenced, portable houses erected, and water laid on to this section. Foundations have been laid for three sections of the Brooder House which is now being built. Pullets to re-stock the laying houses have been hatched.

All poultry specialist extension services for Matabeleland and the Midlands were provided from this Station.

Veterinary

There have been no outbreaks of serious poultry disease. Veterinary import control has been strictly enforced when necessary. The Veterinary Department continues to provide various vaccines and a diagnostic service of great value to poultry farmers.

Extension Services:

Extension services of a specialist nature have been carried out whenever required in the Colony and these have included judging at Agricultural Shows and staging of exhibits; attendance at Farmers', Poultry Clubs' and Young Farmers' Clubs meetings and advice to feed manufacturers and individual farmers.

Dairying

Dairying Season

Except for certain areas in the Eastern Districts, where rainfall was patchy after January, the main dairying areas had a good season. The rain started early in most areas and was evenly distributed so that although the seasonal amounts did not differ greatly from the average there were no prolonged dry spells or widespread heavy rain.

Production of Dairy Produce

During the period 1st October, 1953, to 30th September, 1954, the Dairy Marketing Board purchased approximately 6.5 million gallons of milk as compared with 5.6 million gallons during the previous season, while the estimated total production of milk in the Colony was 11.8 million gallons as compared with 11 million gallons in the previous season. These figures illustrate that the general trend of the industry, which has been evident over the past decade, is towards the disposal of more milk as whole milk off the farms. Provisional estimates of butter production during the 1953/54 season indicate that there was a drop in production of about 6 per cent. from approximately 964,000 lbs. in 1952–1953 to 900,000 in 1953/1954. There was a considerable increase in cheese production, which can be accounted for entirely by the increased quantity of milk purchased by the Dairy Marketing Board which was surplus to fresh milk demand and was manufactured into cheese.

The figures given in the following table for milk, butter and cheese production illustrate the rapid expansion of the industry and the general trend towards the sale of whole milk off farms.

DAIRY PRODUCTION 1951 TO 1954

Year	Butter (1,000 lb.)	Cheese (1,000 lb.)	Liquid milk (*) (1,000 galls.)	Total gallons
1951/52	975	490	6,730	10,390,000
1952/53	964	578	7,350	11,070,000
1953/54	906	1,002	7,750	11,850,000 (estimated

(*) Milk available for use as fresh milk, fresh cream and ice cream.

Creameries, Butter Production and Consumption

The tendency for a slight fall in creamery butter production has been continued while consumption of butter shows a gradual increase. The indications are that unless there is a change in the general trend of the industry an increasing quantity of butter will have to be imported to meet the demand for butter in the territory.

Exports of butter, mainly to P.E.A., remain substantially the same as in the previous two years at 79,000 lbs., while imports were slightly less than in the previous year. The stock position at the end of the season was slightly better than at the end of the previous season.

There was no change in butterfat prices during the season and five seasonal prices operated as in the previous year. There have been no changes in the wholesale and retail prices of first and second grade creamery butter during the season and third and below grade butter have been free of price control.

The percentage of first grade butter manufactured during the season was slightly lower than in the previous season and there was a corresponding increase in the percentage of third grade butter. The percentage of second grade butter remained about the same.

Of the 2,519,000 lbs. of butter imported during the season, approximately 61 per cent. came from New Zealand, 27 per cent. from Kenya and 12 per cent. from the Union of South Africa.

All imported and locally manufactured butter was graded before sale and degradings were negligible, while the quality of butter within the grades was approximately the same as in previous seasons.

Cheese Factories, Cheese Production and Consumption

Total cheese production reached the record total of just over 1,000,000 lbs. Only one farm cheese-maker manufactured Cheddar cheese during the period and the quantity manufactured was only about 0.7 per cent. of the total Cheddar cheese made. Other farm cheese-makers making unspecified types of cheese contributed approximately 2.3 per cent. of the total cheese manufactured.

The quantity of cheese manufactured by the Gazaland Co-operative Cheese Factory, Chipinga, was substantially the same as last season and it is apparent, therefore, that the very large increase in cheese production was due to the greatly increased supply of fresh milk to the Dairy Marketing Board. This season some surplus milk has been manufactured into cheese throughout the winter months.

It is clear the production of cheese in Southern Rhodesia is catching up with consumption very rapidly and if the present trend continues the production of locally manufactured Cheddar and Gouda cheese will meet the demand for these cheeses during the coming season. The main difficulty during the coming season is likely to be the manufacturing capacity available rather than the supply of milk.

Taking the overall figures, the quality of the cheese manufactured during the season 1953/54 was very poor, but nearly all of the low quality cheese was produced in one factory where the cheesemaking facilities were inadequate to handle the large quantities of surplus milk available during the flush season. Cheesemaking was further complicated by the necessity to transfer milk from Gwelo to Salisbury during December and January and the poor facilities for handling this milk at Gwelo.

The Gazaland Co-operative Cheese Factory, Chipinga, is the only cheese factory operating outside the subsidized fresh milk marketing scheme. This factory and the one farmhouse cheese-maker who makes Cheddar cheese, were subsidized to the extent of 6*d* per lb. of cheese manufactured during the year.

Wholesale and retail prices of first and second grade Cheddar and Gouda cheese were increased by 1*d* per lb. in February, 1954.

Milk and Cream Supplies

The volume of milk purchased by the Dairy Marketing Board continues to increase and during this season sufficient milk has been available to supply the fresh milk demand in all the areas where the Board operates, plus a surplus throughout the

year which was manufactured into cheese at Salisbury and Bulawayo. The following figures indicate the rapid increase in milk supplies to the main centres during recent years. Figures for the years 1951/52 refer to the milk purchased by the Milk Marketing Committee which operated before the Dairy Marketing Board was formed.

TABLE II

Year	*Milk purchased (1,000 galls.)*	*Manufactured into Cheese (1,000 galls.)*	*Apparent consumption as whole milk and cream (1,000 galls.)*
1951–52	5,235 ..	249 ..	4,986
1952–53	5,638 ..	441 ..	5,197
1953–54	6,494 ..	910 ..	5,584

These figures relate to the areas in which the Dairy Marketing Board operates only and not to the whole territory.

The price of milk to consumers remained unaltered until August, 1954, when the price of milk sold wholesale in quantities of over three gallons on a credit basis was increased from 3*s*–9*d* per gallon to 3*s*–11*d* per gallon. There was no change in the price paid to producers for milk delivered to the Dairy Marketing Board and three seasonal prices continued to operate.

All milk continued to be purchased on a quality basis and the prices given above refer to those payable for standard milk. Quality premiums and deductions remained the same as before and all sampling testing and the calculations of the monthly pay-out per gallon for each producer were carried out by the Dairy Officers of this Branch. This work entailed the sampling and testing of well over 7,000 consignments of milk and the calculations necessary to ascertain approximately 3,600 payout figures.

The number of producers supplying milk to the Dairy Marketing Board is increasing annually and this means that the work of the Dairy Branch increases proportionately. During the year 35 more producers supplied milk to the Dairy Marketing Board which is an increase of just over 12 per cent. on the previous season.

Fresh Cream and Other Dairy Products

Although no accurate figures are available for the demand for fresh cream it is estimated that approximately sufficient fresh cream was available to meet the requirements during the season. A large quantity of the fresh cream is supplied by farmers direct from their farms in cartons and sold through retailers in the towns. It is probable that the fresh cream trade could be increased if more regular supplies were available.

Milk Recording

Owing to the staff position it has not been possible to expand the Milk Recording Scheme during the year, although many farmers have applied to have their herds recorded. It has been possible to maintain the service to those herds already in the scheme but this has meant that no leeway has been made up with the office work and the compilation of annual statistics.

Statistics for the year 1951/52 were completed and the results are encouraging. Herd averages show a significant improvement over the previous years and the results of the Milking Competition show that with good management it is possible to produce very good records in this country. This improvement in the quality of dairy stock and its management is very gratifying. Examination of the herd averages for pedigree herds shows that 50 per cent. of these herds produced an average of over 300 lbs. of butterfat per cow.

Authority was granted during the year for the appointment of a suitably qualified Dairy Officer to take charge of the Milk Recording Scheme and to establish a Bureau of Milk Records. It is hoped that this appointment will be made during the coming season and that it will be possible to reorganize the scheme to make it more effective for the dissemination of information. A certain amount of reorganization has taken place during the past season, which should make it possible to bring the compilation of annual statistics up to date during the coming year.

An efficient milk recording scheme, allied with a bureau of milk records which can make available the information collected, is of paramount importance to the dairy industry in any country and especially where artificial insemination is widely practised For the development of artificial insemination in this country it is essential that the Milk Recording Scheme shall be expanded and a Bureau of Milk Records established. in the very near future.

General

During the 1953/54 dairying season the number of producers entering the whole milk trade by the supply of milk to the Dairy Marketing Board has continued to

increase. The number of herds supplying whole milk into the main consuming areas has more than doubled during the last five years. This increase in the number of suppliers, plus the increasing production from other herds, accounts for the very large increase in the milk purchased by the Dairy Marketing Board.

Milk production during the 1953/54 season was sufficient to meet the fresh milk demand and a small surplus over fresh milk requirements was manufactured into cheese even during the leanest winter months. Cheese manufacture is increasing rapidly and, providing the coming season is favourable, it is estimated that sufficient milk will be supplied to meet the full requirements of Cheddar and Gouda Cheese. The limiting factor for cheese production during the coming season will be the facilities available for the manufacture of the large quantities of milk likely to be supplied during the flush period. The position of the butter industry is less encouraging and it is evident that more than two-thirds of the requirements of butter will have to be imported for some time to come.

The scheme for the purchase of milk on a quality basis, which was introduced in 1949, has demonstrated the value of this system for improving the quality of milk supplies. In spite of the fact that the standards for the Methylene Blue Test were increased by one hour in April, 1953, the percentage of producers who met or exceeded the standards laid down for this test was slightly higher for this season than for the previous season. The dairy industry can be proud of the fact that it is ahead of nearly all other countries in its system for the purchase of milk.

From the increase in total milk production, the results of the milk tests and the improvements in production averages of herds in the Milk Recording Scheme, it is apparent that methods of milk production are improving. This is encouraging but it is also evident that further improvements in efficiency are required. The establishment of a Bureau of Milk Records and an extension of the Milk Recording Scheme should prove of inestimable value to the industry in increasing the efficiency of milk production.

As the Dairy Marketing Board is spending large sums of money in new buildings and equipment for the handling of milk and milk products the Dairy Industry as a whole can look forward with confidence to the future.

FIELD HUSBANDRY

The Maize Crop

Estimate of Yield

The final estimate of European grown crops of maize is that 2,870,000 bags of 200 lbs. nett will be produced from 384,000 acres which gives an average yield of 7.5 bags per acre. This is the highest total and yield per acre so far reaped in the Colony, the previous highest being 2,454,047 bags and 6.8 bags per acre in the 1951/52 season. Of this total Mashonaland is expected to produce 2,572,600 bags from 318,600 acres giving an average yield of 8.1 bags per acre, compared with a total of 2,109,923 bags from 299,414 acres for the 1952/53 season. The average yields of 7.5 and 8.1 bags per acre for the whole Colony and Mashonaland respectively are the highest recorded since statistics have been taken. Almost exactly 70 per cent. of the total maize crop is expected to be produced in the maize belt consisting of the Mazoe, Salisbury, Hartley and Lomagundi (including Urungwe) Districts. The average yield of these Districts is expected to amount to 9.23 bags per acre or 1.73 bags per acre more than the average for the country.

It is expected that the past season's crop will supply all the Colony's requirements and that there will be a surplus to carry over to the following season.

Maize Grading and Moisture Testing

Owing to the comparatively early cessation of the rains, farmers had very little difficulty in having their maize of a sufficiently low moisture content when ready for despatch. As a consequence very few samples were sent in for test.

Southern Rhodesia Seed Maize Association

The Southern Rhodesia Seed Maize Association and the Government continue to employ two full-time inspectors. The Association pays two-thirds of the Inspectors' salaries and the Government one-third, and the travelling expenses.

Final Report for the 1952/53 Season

The season 1952/53 was the fifth since the commencement of growing hybrid maize. There were 3,113 acres in production which is 462 acres less than in the previous year. The amount of seed sent to the agents for disposal was about 300 bags less than that of the previous season. The approximate figures are 1951/52 20,800 bags from 54 members; 1952/53 20,500 bags from 45 members. The average

yield per acre of saleable seed was 6.6 bags when butts and flats are combined. This is the highest yield yet recorded and exceeds by one bag an acre the previous highest yield. Local sales amounted to 16,500 bags, leaving approximately 4,000 bags for export.

The improvement shown in the previous year in the preparation and bagging of the seed has been maintained, but a few members consider they can dispense with tipping and butting their ears prior to shelling off the seed, and then rely on the grading machines to remove the round and misshapen kernels. Although the desired result may be attained with the thick kernels it is not so with the tips. Certain growers still pay too little attention to the removal of the fluffy chaff which rubs off the tips of the kernels while they are being dressed with the fungicide.

The difficulty experienced hitherto with finding suitable machines for grading seed has now been overcome. Experimental machines which are imported from the United States of America have given excellent results. A machine which will complete the required four separations in one operation can be purchased for a little over £100 and a larger and more substantially built machine can be made locally for a cost of about £250.

Sales to the United Kingdom

The 1952/53 season was the second during which Southern Rhodesian hybrid maize was exported overseas. During this season 4,062 bags were exported. To date there has been no report received as to the behaviour of this consignment of Southern Rhodesian hybrids. Furthermore, up to the present, no orders have been received for seed of the present crop. It is still possible that orders will be received, but it would appear that American seed is being placed on the European market. Also each European country is endeavouring to produce hybrid maize specifically adapted to its conditions and it is understood that some countries have made considerable progress in this direction.

Hybrid Maize for Natives

During the previous two seasons the Department of Native Agriculture has purchased £10,000 worth of hybrid maize seed each year. It is understood that a little over £8,000 worth of seed is to be purchased this year. It is very much regretted that the sum available has been reduced and not increased very materially as there is no doubt that hybrid maize is superior to open pollinated varieties when grown in Native areas as when grown on European farms as the following figures very clearly show:—

	Hybrids	*Open pollinated varieties*	*per cent. increase*
		Bags	*per acre*
Salisbury Experiment Station 1949/50	30.16	24.18	24.7
" " " 1950–51	11.83	6.22	90.2
" " " 1951–52	21.33	17.38	22.7
" " " 1952–53	33.84	26.93	25.7
Native Areas 1951–52	7.8	4.1	90.2
European Areas 1952–53	7.58	4.48	69.2

Sales to European Farmers in the Federation

Although it has been a great disappointment that, as yet, there have been no orders from overseas sources for our hybrid maize and that the Department of Native Agriculture has available a smaller sum of money for hybrid seed, nevertheless it is pleasing to record that the demand by European farmers in the Federation for hybrid seed exceeds quite considerably that of last season. In particular the demand for hybrid seed this year from Northern Rhodesia has greatly increased.

Interim Report for the Current Season 1953/54

Applications for seed indicated that 4,190 acres would be sown this season, but subsequently a number of members sowed less than they had intended. This with 200 acres of disqualified fields brought the total down to approximately 3,580 acres.

Seed was supplied to 72 members. Of these two had the whole of their crop disqualified, and 22 wished to grow for their own use only. Hence 48 members should have seed for sale as compared with 45 last year. Ten members sowed over 19 and under 30 acres. The season has been very favourable and it is probable that there will be over 25,000 bags of seed available this year.

It is pleasing to record that with few exceptions, growers placed their fields in places easily accessible to the inspectors. Heavy rainstorms and repairs to cars hampered the movements of the inspectors, but they were able to visit the breeding fields at least twice during the detasselling period. Exceptions to this were a few members who live distant from Salisbury and arrangements were made with officers of the Department of Conservation and Extension to inspect their breeding plots. On the whole the detasselling was performed satisfactorily, though in a few cases, the standard achieved was below that required for certification in terms of the rules, and these plots were disqualified.

In spite of heavy rains in the early part of the season there was very little *Helminthosporium* attack on the leaves of the plants and cob-rot diseases such as *Fusarium* were much less than usual.

Sets of testing pans which have the appropriate sized holes and slots have been imported to enable growers to test the accuracy of the work of their grading machines and make quite sure that their seed will comply with the grading regulations.

Small Bags: This season small bags, with a capacity of 100 lbs. and with a suitable design and lettering have been introduced. It was hoped that all hybrid maize would be sold in 100 lbs. bags this year, but owing to the fact that supplies could not meet demands, some growers have perforce had to use 200 lbs. bags. Some of the small bags supplied are of inferior quality and the stencilling of the name needs improvement but it is hoped that all these teething troubles will be fully overcome next year.

Fungicides and Insecticides Dressings: More care needs to be exercised by some members to see that they use the correct amount of seed dressings, as some members apply far more than is required while others do not apply sufficient.

Open-pollinated Varieties: During the past year or two there has been an increase in the number of members who grow open pollinated maize and who wish to take advantage of the higher price for seed sold under the guarantee of the Association. The grading of open-pollinated maize is far from satisfactory and there is an urgent need for definite standards to be laid down for the benefit of both growers and inspectors.

Membership of the Association: The following table gives a comparison between the 1953/54 season and previous seasons:—

Season	*Total membership*	*Producing hybrid seed*	*Total acreage grown*	*Seed available for sale in bags of 200 lbs.*
1948/49	57 ..	40 ..	350 ..	1,774
1949/50	77 ..	65 ..	3,150 ..	13,367
1950/51	91 ..	69 ..	3,275 ..	17,226
1951/52	100 ..	77 ..	3,500 ..	20,800
1952/53	96 ..	80 ..	3,113 ..	20,500
1953/54	94 ..	72 .. (2 disqualified = 70)	3,580 ..	25,500 (estimated)

Hybrid Maize Farm

Efforts to secure a suitable farm for the production of single hybrid and the bulking of inbred seed have continued but so far without success. The need is becoming more urgent every year.

Seed Maize Prices

There has been no change in the prices for seed maize during the present season which remains as follows:—

	Price per bag of 200 lbs. £ s d
Certified Double Hybrid Seed, Large Flats and Medium Flats	5 10 0
Certified Double Hybrid Seed—Large rounds	3 10 0
Certified Double Hybrid Seed—Small rounds	3 5 0
Certified Open-Pollinated Seed	4 0 0
Standard Open-Pollinated Seed	3 0 0

Summer Wheat Trials

As mentioned in last year's Report no further importation of wheat was made from Kenya Colony, but the 43½ bags remaining over from the previous season were distributed for trial to farmers. Only one farmer has, up to the present, reported any success with the crop. Most farmers report crop failures, due mainly to weeds smothering the crop. On Government Experiment Stations where weed killers are applied, the weed problem can be controlled very successfully indeed but none of the varieties tried out commercially are really suitable as summer wheat in this Colony. On the Agricultural Experiment Station, Salisbury, new importations and selections continue to be made and there is some very promising material available, but the services of a fully qualified wheat plant breeder are urgently required.

Sorghum Production

Owing to a series of good rainy seasons, sorghum growing has rather fallen into disfavour among farmers. Depredations by grain-eating birds, especially Queleas, also discourage farmers from growing the crop, and it does not appear that any appreciable headway will be made with this crop until the Quelea menace has been largely overcome.

During the 1952/53 season there was considerable overproduction of sorghums and small grains and the Grain Marketing Board had an embarrassing surplus of these grains, especially sorghum, which it found very difficult to dispose of. One of the main reasons for this surplus was the excellent rainy season experienced. Unfortunately the sorghum which found its way into trade channels was of a most inferior quality containing grain of native sugar cane (sweet sorghum—which has never been regarded as a feed grain), bitter varieties and a large quantity of foreign matter. The result was that this so-called sorghum grain very quickly fell into disfavour with merchants and feeders of poultry, dairy stock and pigs. It will be difficult now to persuade feeders and merchants to accept the fact that commercially pure varieties of grain sorghum have, to all intents and purposes, the same feeding value as maize. It is as well to state now that, in the United States, sorghum replaces maize for feeding farm animals in all those areas where it is grown.

In an attempt to assess the true merits of sorghum grain arrangements have been made with the Pig Industry Board for feeding trials using recommended, named, commercially pure varieties of grain sorghum. The results are awaited with very great interest.

Miscellaneous Crops

Green Manure Crops

Legume green manure crops still continue to prove their worth and the demand for seed is as great as ever. Owing to a shortage of sunnhemp seed in the Colony, 50 tons of seed were imported from India and to satisfy the further demand for this seed, negotiations have been conducted to import another 50 tons.

Safflower

Very little interest has been shown in this crop during the past season.

Dwarf Castor Bean

There has been recently, considerable interest shown in this crop, as a result of a visit from a representative of a large French Company which has stated that a fixed price will be paid for castor bean seed and that decorticating machines will be set up at strategic points along the railway line. There is no doubt that the inclusion of dwarf castor bean in the rotation would be a highly desirable practice, especially in the marginal and lower rainfall areas, as this crop is fairly drought resistant and would provide another cash crop in the rotation.

Winter Wheat

Crop estimates are not yet to hand, but it does appear that there will be quite a considerable increase in production this year, and it is considered that production would have been still greater had farmers known earlier what the price would be for the current season's crop.

Some excellent crops of wheat have been inspected this year, and there is no doubt whatever that this Colony can produce wheat which compares very favourably with crops grown in other parts of the world.

An interesting development in irrigated winter wheat was tried out by one farmer in the Hartley District who grew a very good crop under spray irrigation. He averaged over 13 bags an acre from 15 acres, and is so pleased with the result that he contemplates planting 100 acres next season. His neighbours watched this year's trial with great interest and it is stated will also be growing winter wheat under spray irrigation next season. It is possible that quite a considerable quantity of wheat may be grown in this manner especially by farmers who grow tobacco under spray irrigation. It is interesting to note also that the Italian farm labourers in the Marandellas District grew small acreages of very good wheat this season under spray irrigation.

Southern Rhodesia Seed Potato Association

It is pleasing to be able to record that, at long last, the Scheme as drawn up and submitted by the Departmental Potato Committee has been accepted by those farmers in the Eastern Districts who are seriously interested in seed potato production.

Owing to the prevalence of bacterial wilt, particularly in the Inyanga and Odzani Districts, which may prove to be a limiting factor in the development of an extensive seed potato industry, it was felt that it would be better to introduce a less ambitious scheme than a full certification scheme.

Although based on the standards laid down for the proposed Southern Rhodesia Seed Potato Association, the present Scheme only provides for " recommended " as distinct from " certified " seed. Two or more field inspections and one tuber inspection by qualified officers of this Department and that of Conservation and Extension will be made of the crops of growers who enter the Scheme. It is anticipated that this

interim scheme will test the potentialities of a Seed Potato Association being developed in the Eastern Districts.

SALISBURY EXPERIMENT STATION

The rainfall for the season from the 1st October to the 30th April, 1954, was 27.96 inches compared with the mean of 31.10 inches for the previous 30 seasons. This was fairly well distributed over the period from the last week of November until the middle of March, except that rains were light until the end of December. The Station experienced fairly severe attacks of *Helminthosporium turcicum* on maize and Late Blight on potatoes but damage was not as severe as during the previous season. Army Worm caterpillars were noticed on young maize and wheat plants on January 11th, and with the assistance of the Entomology Branch, spraying was started on the same day, as a control measure. In consequence, although the attack developed into the most serious for many years, no lasting damage was done to the crops.

Maize

Yields of maize were generally very good, without quite reaching the exceptional high records of the previous season. It was again strikingly obvious that yields are considerably higher on plots which have a rotation system, including a wide range of different crops and which receive periodic dressings of animal manures. They strongly point out the advantages of mixed farming and the growing of as many different crops as can be worked into the rotation system economically.

Phosphate Trials

In several trials the increases in yields from applications of phosphate were considerably higher than normally occur on the station. In the phosphate trial where, because the same plots are fertilized each year, the results are cumulative, the following yields were obtained.

	Yields (in bags of 200 lbs. per acre)			
	Control	*Super phosphate*	*Rock phosphate*	*Bone meal*
Single dressing, 30 lbs. P_2O_5 ..	19.49 ..	25.57 ..	24.05 ..	25.94
Double dressing, 60 lbs. P_2O_5 ..	19.49 ..	26.84 ..	27.43 ..	27.38

This crop followed potatoes. Adequate dressings of potash and nitrogen were applied to all plots. It is thought that the dry conditions in the early part of the season were responsible for these exceptional results, and that in the unfertilized plots the amount of phosphates available to the plants was very limited during this period. It must be emphasized that such large responses to phosphates are quite abnormal on the station. Nevertheless these results show the importance of maintaining the phosphate level in maize lands.

Nitrogen Trials

In general, responses to nitrogen were good, but in the regular long-standing trial in which varying amounts of sulphate of ammonia and nitrate of soda are applied at different stages of the plants growth, responses were small. This is attributed to the unexpected influence of a grass mulch laid down for a short period on the previous maize crop (1952/53). The results of nitrogenous applications in the phosphate placement trial are given as being more representative of the effects of nitrogen in the season under review. The yields for the same trial in the previous season are included for comparison.

Season	*Control*	*250 lbs. nitrate of soda*	*500 lbs. nitrate of soda*
1952/53	21.5 ..	26.5 ..	27.6 bags per acre
1953/54	19.6 ..	26.3 ..	30.4 „ „ „

The Nitrate of Soda was applied six weeks after planting.

Potash

There was no response to applications of potash in any of the trials on the station this year.

Removal of Different Parts of the Plant

The trial to determine the effect of the removal of different parts of the plant was laid down in a similar manner to the previous year. The yields of grain in bags of 200 lbs. per acre are given for the three seasons.

Season	*A*	*B*	*C*	*D*	*E*
1951/52	23.28 ..	19.30 ..	16.81 ..	21.49 ..	—
1952/53	27.68 ..	29.15 ..	24.31 ..	26.42 ..	28.39
1953/54	24.38 ..	22.93 ..	19.45 ..	21.68 ..	24.65

A = Control
B = Tassel and three top leaves removed as soon as tassels appear
C = Stalks cut above the ear for ensilage when the grain is at the milky stage
D = Stalks cut above the ear for ensilage when the grain is at the early glazed stage
E = Complete desuckering.

Protein Content of Grain

This trial was repeated with a similar lay-out as the previous year and the results of both seasons are given for comparison. The object is to investigate the relationship between the nitrogen in the soil and the protein in the grain using a high and a low yielding variety to show how soil nitrogen can limit the protein in the grain.

Nitrogen Treatment

	Hickory King				Hybrid N3–1–4–9 × A5–7–6			
	1952–53		1953–54		1952–53		1953–54	
	Yield	*Protein per cent*	*Yield*	*Protein per cent.*	*Yield*	*Protein per cent.*	*Yield*	*Protein per cent.*
Nil	20.75	8.9	10.44	7.5	26.01	8.4	18.46	7.5
300 lbs. N/S ..	23.09	9.2	16.82	7.8	27.74	9.0	20.42	8.0
600 lbs. N/S ..	25.99	9.8	17.86	8.3	31.03	10.2	23.00	8.6
Mean	23.28	9.3	15.04	7.9	28.26	9.2	20.63	8.1

It will be seen that the results obtained this season are very similar to those of last year. The trial was laid down on land of rather low fertility and growth was poor by comparison with the previous season.

Other Crops

Potatoes

The outstanding result of this season's potato trials was the yield obtained from a late planting of Pentland Ace, approximately 94 bags per acre. This is far above yields of up-to-date ever obtained from plantings as late as the 28th of December, and in the coming season the variety will be tested as a main summer crop. Stands were so poor in the main variety trial that results were vitiated. Sprouting was so advanced in some of the earlier-maturing varieties that it was decided to plant dry in the middle of October. This meant that the tubers were in the ground for nearly six weeks before germinating rains fell. The American varieties Kennebec and Monac yielded well but gave a far higher proportion of very large tubers than the British varieties.

Wheat

Single observation plots of 59 varieties were planted towards the end of December. Good stands were obtained but the crop was attacked by Army Worm whilst the plants were in the very young stage. Records of yield, rust incidence, lodging, etc., were taken, and all the more promising varieties will be grown again. A number of varieties were yielding ten and 11 bags an acre.

Fodder Barley

It is felt that if this crop can be grown satisfactorily it would have a useful place in Rhodesian farming in the concentrate ration for pigs in place of part of the maize used at present. Varieties of fodder barley are being grown in the United Kingdom, because, although they may not be suitable for malting, they give rather higher yields of grain suitable for feeding than some of the established varieties. The varieties Ymer and Herta were sown in observation plots early in January and yielded 7.5 and 7.3 bags (150 lbs.) per acre of grain respectively. This was on land which had not been heavily manured and the crop would probably have benefited from a dressing of nitrogenous fertilizer. This crop may be useful for planting when it has become too late to sow maize with any expectation of reasonable yields.

Leguminous Crops

The *Soya Bean* crop again grew well and yields were high although lower than in the 1952–53 season. Strain No. 147 gave the best results for the third year in succession with a yield of $8\frac{3}{4}$ bags per acre, but the differences in yield between the leading strains were very small. Row spacings of 2 feet outyielded row spacings of $2\frac{1}{4}$ and 3 feet with the plants spaced at 3 inches in the row in every case. It is proposed to discontinue the spacing trials in their present form as the result has been the same every year. A large number of new introductions from Angola were grown in single observation plots. Some were quite promising under Salisbury conditions but many of them were unsuitable for various reasons, frequently shattering badly.

Velvet Beans also grew well. The new strains yielded between 12 and 13 bags of seed to the acre. Somerset $8\frac{1}{4}$ and J 7,452 and 77 between 4 and 5 bags to the acre.

In the *Groundnut* trials there were no significant differences between the different methods of cultivation tested. Earthing up the rows of nuts, and loosening the soil surface to allow the ready penetration of the flower shoots, both proved no better than merely removing weeds in plots planted to the variety Valencia. These trials have been in progress for five years and they have shown that there is no advantage, from the point of view of yield, in earthing up groundnuts, except possibly in a very

dry season. Keeping the surface of the soil loose during the period when the plants are flowering has given a very small increase in yield. These trials are to be discontinued in favour of a groundnut manurial trial.

Other Activities

The Senior Agriculturist spent three and a half months on a visit to the maize producing areas of the United States, under a scheme sponsored by the Foreign Operations Administration of that country. The Assistant Agriculturist assisted in the the judging of the maize and produce classes at the Agricultural Shows held at Gatooma and Sinoia the Senior Agriculturist gave a talk to the Gatooma Farmers' and Stockowners' Association on "*Some Aspects of Maize Production*" in February. The Station has continued to carry out the issue of single cross maize seed to members of the Seed Maize Association.

General

The Chief Agriculturist attended the Third Annual Maize Breeders' Conference held in Pretoria on 20th–22nd September. Some very interesting papers were read and discussed and it was resolved to continue the exchange of material whereby Southern Rhodesia will test a large number of South African inbred hybrid and open-pollinated lines of maize, for resistance to *Helminthosporium* attack, and the Natal Agricultural Research Institute will reciprocate by testing Rhodesian material. In view of the fact that *Puccinea polysora* does not appear to be a serious disease in Southern Rhodesia it was decided to test lines only in the Sabi Valley for resistance or susceptibility to this disease.

The opportunity was taken to study Union methods of grading potatoes while in Pretoria. The Union Department of Economics and Markets was most co-operative and gave every facility. It is obvious that should some such scheme be introduced in this Colony, it would be necessary to send an official to Newtown Market, Johannesburg, for a month's training in grading methods.

Agricultural Shows

The Chief Agriculturist judged the maize, agricultural produce and district exhibit sections at the Bindura, Umtali, Fort Victoria, Salisbury, Gwelo and Bulawayo Shows. The maize classes at the Salisbury and Bindura Shows were the best yet judged and were outstanding.

HORTICULTURE

The year was a very difficult one for horticulture in most areas. Vegetable crops were seriously affected as the result of excessive rain in Mashonaland, while the Eastern Districts experienced a year of very low rainfall. For most of the season, frosts were light but a period of severe frost towards the end of July did considerable damage. In the main, hours of sunlight were longer and this had the beneficial effect of enhancing the colour of deciduous fruits, particularly apples.

Interest in fruit-growing was well maintained but less confidence was shown in the production of fresh vegetables due to weather conditions and marketing problems. There was a great demand in the Eastern Districts for fruit and vegetables for processing.

Citrus

Increased crops of citrus were obtained and it is pleasing to record an improvement in the quality and handling of fruit offered for sale. Oranges and naartjes sold readily and the juice industry was more interested in bulk quantities of local lemons. Late and out-of-season crops of oranges were in great demand and more plantings for this purpose made.

The great demand too for nursery trees continued with no improvement in the supply position. Some private work was commenced with propagating Nucellar stocks of oranges for trials to obtain virus-free material. Many young citrus trees were killed by frost.

Declared sales of citrus for 1952/53 (including fruit utilized by the citrus estate for processing) were as follows:—

	(Cases of 75–85 lbs.)
Oranges	263,919
Lemons	17,904
Grape fruit	5,236
Other	2,397
Total ..	289,456

This is the largest quantity of citrus sold since 1947/48 season with lemons showing a considerable increase. The fruit was valued at £235,661.

Citrus Trees

For the year 1952/53 the number of citrus trees, reported by farmers in the country, totalled 234,460, an increase of 19,957 over the previous year. Of these, 136,185 were bearing trees. Orange trees accounted for nearly 80 per cent. of all citrus trees.

Citrus Fruit Imports

These show a considerable increase and totalled 1,517,867 lbs. valued at £10,810. (1952 £7,314.)

Deciduous Fruit

Extended plantings of deciduous fruit trees particularly apple, plum and cling peaches were recorded during the year. The canning industry at Umtali advised that they could take double the quantity of peaches. Deciduous fruit crops were fair to good, apples having cropped heavily.

Due to the prolonged cold, the previous season, all fruit crops were later in ripening. This coincided with an early Cape year and competition from imported fruit was far greater than ever, apples and plums being particularly affected. Even with fruit consignments of equal quality, appearance and presentation, a strong bias still exists in favour of the imported, and this is likely to persist for some time.

Commercial trial plantings of grapes have grown well but it is too early to obtain variety and cropping information.

Deficiency Diseases

Many cases of minor element deficiency diseases were noted, particularly of manganese and zinc in apples and peaches. These are responsible for much of the fungous disease particularly " dieback " through trees being nutritionally unsound. Good results were obtained spraying a solution on to young foliage.

Deciduous Fruit Trees.

The larger growers reported a total of 166,432 trees which is 6,456 more than the previous year. As only 65,521 trees are of bearing age a considerable increase in local fruit production should be realized in a few years' time.

Imports. Deciduous Fruit

For 1953, imports of apples, pears, plums, peaches and apricots totalled 3,517,822 lbs. valued at £94,353. While this is 36,000 lbs. less than 1952, it represents an increased value of £4,124. A great deal of this fruit represents supplies held in cold storage.

Grapes and miscellaneous fruit imports were 896,834 lbs. valued at £22,945.

Sub-Tropical Fruit

The opening of a branch factory for processing fruit at Chipinga considerably stimulated plantings of Queen pineapples in the area. Granadillas were asked for in quantity.

Planting of Cavendish bananas in the Umtali South area was extended but this will only supply a very small portion of our needs for some time. The quality of the fruit was excellent and extremely well handled. A vast improvement in the trade in bananas has followed the erection of ripening and curing chambers at Salisbury and Bulawayo. Excellent quality avocados, attractively packed, were marketed from Melsetter, and sold well.

Trees

For 1952/53 the number of sub-tropical fruit trees reported by growers in the Colony was 72,667.

Sub-tropical Fruits Imported (Excluding Citrus)

For 1952/53 imports of the fruits totalled 9,857,589 lbs., with a value of £59,814 (1951/52 £48,487). This considerable increase clearly indicates the inability to use our resources to meet our increased needs.

Vegetables

The steady increase in vegetable production continued. The recorded acreage of the larger producers for 1953 was 3,512 (1952 3,118) with a yield of 9,219 tons. Much of the production is still of a haphazard nature with wide fluctuations of supply. Some growers were still too prone to follow seasons rather than regular successions of cropping with a steadier price range.

Vegetable shortage

Salisbury and Bulawayo experienced a vegetable shortage in summer, due to heavy rains and disease. Better cultural conditions, timing of sewings and protection measures for transplants would do much to obviate production losses during bad weather.

Good crops of vegetables were grown in the Salisbury area in glasshouses and frames and this venture will be followed with interest.

Experimental plantings of English tomato varieties have been most successful. Yields have been good and a pleasing factor has been the absence from cracking during cold spells.

Molybdenum deficiency of cauliflowers was again widespread.

Vegetable Imports

Our dependence on Union imports, especially during shortfalls of local production, is shown by the 1953 imports of 2,356 tons of fresh vegetables valued at £45,062 (1952 £40,150).

Onions

More interest was taken in onion-growing, the reported acreage increased by 63 to 280 acres with a yield of 15,974 bags (120 lbs.). Onion imports for the year were 27,159 bags, valued at £40,275 which could be reduced considerably.

General

Seed Production

A continued increase in seed production was noted: good standards maintained and seed wholesalers were appreciative of the quality.

Nursery Planting Material

Locally produced material is still small in relation to imports which were of £27,615 value (1952 £23,077).

Advisory Work

There was a marked increase in requests for all horticultural services which were far beyond the capacity of one officer. This has unfortunately meant lack of means to do follow-up work and much loss of efficiency in the industry. A need to decentralize much of the work is necessary.

Judging of fruit and vegetables was carried out at Bindura, Sinoia, Gwelo, Salisbury and Bulawayo Agricultural Shows, at eight Flower Shows and five Young Farmers' Club finals. Twelve talks and demonstrations were given in various parts of the country and four lectures to Senior Students at Gwebi College.

Two articles were published during the year.

"*Molybdenum Deficiency in Cauliflowers*". Rhodesian Farmer.

"*Deciduous Fruit Growing*". *Rhodes Inyanga Orchards.*" Rhodesia Agricultural Journal.

Rhodes Inyanga Orchards

In common with the Eastern Districts, Inyanga was also affected by the low rainfall for the year. Only 36.18 inches were recorded as against 67.48 the previous year.

Fruit Crop and Sales

An excellent set of fruit took place and the trees responded well. Good rains while the fruit was developing followed by little rain during harvesting months were almost ideal conditions for deciduous fruit. The crop was far heavier than usual and 2,332 bushels of apples, pears, plums, peaches and quinces were packed and sold, of which apples alone totalled 21,68 bushels. Fruit sales were £2,748.

D.N.O.C. Spraying

The Dinitro-ortho-cresol-oil dormant period spraying experiments of apples gave decisive variety responses. Rhode Island Greening trees particularly showed considerable improved growth and cropping, while physiological effects were scarcely discernable with White Winter Permain. Ranges of behaviour have been recorded as affecting blossoming and ripening of fruit of other varieties.

Recording Work of Apples

Blossom recording showed the severe effect of the previous September cold, particularly on the late blossoming variety, Rome Beauty, in which ripening was delayed by at least a month.

Crop recording of all bearing trees continued and the following table shows the average yields of picked fruit (in bushels of 40 lbs.) from five trees of the four most grown varieties.

Variety	*Bushels*	*Lbs.*
Chinemuri	10 ..	0
White Winter Permain	5 ..	21
Rhode Island Greening	7 ..	31
Versfeld	13 ..	22

Variety Trials

A few additional introductions of new varieties were made and trees of a local apple variety were distributed to selected growers in various areas for wider trials. Apple rootstocks of the new Malling Merton types are on order from the East Malling Research Station.

Deficiency Diseases

An experiment was commenced to test magnesium deficiency using three different treatments and adequate controls. A number of " Delicious " apple trees were given a soil application of borax to test for pitting of the fruit.

General

A considerable number of several kinds of deciduous fruit trees were propagated for experimental purposes to ascertain the most suitable standard varieties for sale. Grafting wood was supplied to the trade. Regrafting of large apple trees in one block was carried out to improve pollination. Others were worked over to earlier fruiting varieties.

It became necessary to increase the basal opening of shelter belts to improve air circulation. Attempts to smother out Kikuyu grass with a heavy mulch of sawdust after the rains commenced had little or no effect on the grass. A dry season application has since been made. Of the clovers tried out for cover cropping Western made the best growth with Red fairly good and Wild White poor.

GWEBI COLLEGE OF AGRICULTURE

Education

Four courses of students have now passed out from the College. Of the 17 students who sat the Final Examinations in June and July, 1954, all were successful in gaining the Diploma of the College. This course fully maintained the promise which it had given in its first year and the standard of work in examinations and in the competitions for trophies was high.

The demand for Gwebi trained men continues. In fact, it has never yet been possible to supply the requirements of the farming community in this connection. The majority of our students seek posts as Farm Assistants rather than as Technical Assistants in the Government Service.

The College is now going through the second stage of expansion. After the College was opened in 1950 the first stage of expansion was completed in 1951, giving a total accommodation potential of 48 students. The First Year Course, which commenced on the 29th September, 1954, is 37 strong, such new rooms as were available being occupied. By October, 1955, accommodation will be available for a maximum of 72 students.

The Diploma Course continued much as in the past, but with certain modifications and improvements. The policy of bringing in External Examiners to assist with Final Examinations was developed further this year and the further development of this system can be regarded as very satisfactory.

The policy of taking students on day visits to farms and on a week's tour of a specific farming area continued to play an extremely useful part in the educational sphere. This year the Second Year Students' tour extended over 1,000 miles through the Sabi Valley, Chipinga, Melsetter, Umtali and Rusape. The tour was most sucessful and excellent reports on it were written by the students.

The build-up of knowledge which is accruing from experimental work at Gwebi is proving most valuable in the spheres of Field and Animal Husbandry. The grassland work in particular has given valuable pointers to proper management and these are invaluable in giving a real basis for the instruction of students.

Considerable use has been made of educational films and Salisbury firms have co-operated in many demonstrations of equipment to students.

It is with very great regret that the death of G. T. Horton, during an elephant hunt in Northern Rhodesia, is reported. Horton was an outstanding Gwebi Student; not only did he come first in both his First and Second Years at the College, but he was awarded the first Distinction in Animal Husbandry that the College has had, and he also won several trophies.

Development

There have been no major changes of policy on the ploughed fields of the College Farm which were replanned soon after the College opened. The replanning can be considered satisfactory from most points of view and beneficial results in crop yields and reduction of surface erosion are already apparent. The plans for development of grasslands are now moving forward. Twenty-eight acres of Giant Star Grass was established on Kennedy Field during the season; growth is very satisfactory and this Field will fit into the plans for development of planted pastures in which the dairy herd will graze. Kennedy, together with Hayfield and Johnson North, which is to be planted to *Panicum Coloratum* (Makarikari Grass) and possibly some *Setaria Sphacelata* will all be used for dairy herd grazing. The whole area will carry 24 poultry folds (containing 25 birds each) which, when moved once a day, will each cover approximately one acre of grassland in a year.

Sub-division of the paddocks in the north-east corner of the College Farm will make it possible to develop more intensive veld management. In another area overnumerous Msasa trees are being cleared, leaving sufficient only for shade for livestock; ringbarking technique is being tested.

Borehole water has been provided in Acton Paddock on the south side of the College Farm and also in Paddock No. 5 on the west where fertilizer/grazing trials are in progress.

The Public Works Department have now taken over responsibility for new buildings and maintenance in the residential area. In connection with the expansion programme, additions and improvements have been made to the College Hostel and Lecture Halls. The new administrative block, including library, has been constructed and is now occupied, whilst additional staff houses are process of construction. Progress with these buildings has been good but, owing to the increased number of students who have been admitted, there will be a certain shortage of common room and bathroom space for a few months of the 1954/55 College Year.

A new village to house the African labour is under construction, consisting of single and married quarters, school, clinic and playing field, with septic tank sanitation and adjoining allotments for production of their own crops.

Other farm buildings completed during the year include an implement shed, piggeries and spray race. The farm workshop has been renovated, whilst some of the old farm stores have been renovated and improved. The laboratory is now satisfactorily developed, whilst a surface cooler has been introduced in the dairy.

The sports fields are in process of improvement, whilst a start has been made on the construction of a swimming bath of a reasonable size.

The irrigation project has been brought into full production during the year.

Production

Rainfall was lower than average but with good distribution, apart from an early dry spell; 28.13 inches fell compared with the 40-year mean of 31.957 inches. Crops did well; the weather at hay-making was almost ideal and good quality hay was made for the first time since 1950/51.

Details of field production are:—

Crop	*Acres*	*Production*	*Yield/acre*
Maize (Broadbalk Field)	48	925 bags	19.3 bags
Maize (Gwebi South)	200	2,138 ,,	10.7 ,,
Maize Silage	22	200 tons	8.1 tons
Sunflowers	16	93 bags	5.8 bags
Groundnuts	16	324 ,,	20.3 ,,
Oats (S.E.S.)	11	2.6 ,,	0.2 ,,
Potatoes	4	176 ,,	44.0 ,,
Soya beans	4	22 ,,	5.5 ,,
Natal sugar beans	11	14.7 ,,	1.3 ,,

The maize crops on Gwebi South suffered from an attack of Snout Beetle which severely affected stand. The S.E.S. oats gave a very disappointing yield although during growth they had looked most promising; in future these oats will only be grown on a restricted scale and under irrigation for winter silage. The Natal Sugar Beans suffered severely from a prolonged wet spell. Army Worm was controlled by spraying.

Forty-seven acres were devoted to breeding maize, 250 to green manures and 20 to crop husbandry experiments, whilst 80 acres lay fallow.

Winter feeds	*Acres*	*Production*	*Yield/acre*
Veld hay	94.0	50 tons	0.5 tons
Napier Silage	14.7	120 ,,	8.2 ,,
Legume hay (Soya bean)	46.0	47 ,,	1.0 ,,
Maize Silage	22.0	200 ,,	8.1 ,,

Veld grazing is still understocked; heavier grazing is highly desirable from the veld management and fire control points of view and it is hoped this will be achieved when it becomes possible to acquire further livestock.

Sixteen acres of legume (Velvet Bean), grazed by the Friesland herd within an electric fence in Broadbalk Field, assisted in maintenance of milk yields into June, and in the conservation of silage and hay.

The Friesland herd produced 30,600 gallons o fmilk during the period under review, an increase of 5,586 gallons over last year; the herd average was 850 gallons per cow. Twenty-three head of Frieslands were sent to Chipinga Demonstration Farm. One hundred and ninety-three pigs went to Cold Storage Commission, but the sale of pedigree breeding stock was small due to reduction in numbers of pigs pending the transfer of activities to the new piggeries. Twelve pedigree Hereford calves were born during the year, and two bulls were sold at good prices. A Friesland bull was sent on loan to the Veterinary Department A.I. Centre. A.I. from the College bulls continues to be practised with the Friesland herd.

The Poultry Section produced 10,555 doz. eggs (4,555 doz. more than last year); 105 pedigree cockerels and 3,300 lbs. of table poultry. The American Bronze and Beltsville White Turkeys are producing valuable breeding stock; the demand for pens of breeding stock and settings of eggs from the industry is heavy and continuous. Production from the pens of chickens folded on grassland has been particularly satisfactory. A large number of chicks were supplied to other Government Stations.

The increase in production of the College Farm is now becoming noticeable with a revenue of £10,915 in the year under review, whilst College fees produced a further revenue of £6,458.

Research

Investigational work has gone ahead in the limited way that is possible with a staff so fully engaged in the duties of education and the practical operation of the various sections of the College Farm. The adequacy of the present staff for these duties has yet to be tested in the face of a 50 per cent. increase in the student body, due to be achieved in October, 1955. It is most important, when considering the future progress of the College to realize that as practice cannot be separated from science in teaching, research and teaching must always go together. As mentioned in previous Reports, the time is near when the provision of adequate staff to combine research and teaching must be a main consideration at Gwebi. In teaching a subject a lecturer soon becomes conscious of gaps in the information which is available concerning his subject and if he is the right person to teach, he will have a strong desire to investigate the problems he sees. Future developments at Gwebi must make it possible for him to do so.

Crop Husbandry

The vital importance of studies of phosphate application in soils derived from banded ironstone was mentioned in last year's Report. Whilst it was then felt that the placement of phosphate with the maize seed at planting time, as opposed to broadcasting over the plough-furrow in traditional fashion, was justified, there seemed to be a semblance of a case for broadcasting phosphate *before* ploughing. Experiments carried out this year have given strength to this argument. The general conclusion is that the College Farm should consider applying phosphate to the maize crop by the ploughing-in method, which, it is interesting to note was the traditional method in the Eastern Transvaal 25 years ago. Yields in this experiment ranged from 12 to 19 bags/acre, there being a very significant advantage with phosphate, over nil, in all cases and by whichever method it was applied. The question of differential application of a fertilizer *mixture* (N.P.K.) has yet to be investigated at Gwebi.

A start was made in the extremely interesting study of possible interactions between planting date, plant population and plant nutrients (N.P.K.). Points of practical interest are that the planting dates used were 26th October, 14th November, 4th December, 22nd December; plant populations studied varied from 8,800/acre to 18,341/acre and " A " mixture (6:10:8) was applied in dressings varying from Nil to 400 lbs. per acre. Yields ranged from 23 to 36 bags/acre for the various treatments. To draw definite conclusions from the results of one complex experiment would be unsound, but pointers are that, where fertility conditions are good, the College Farm should increase maize plant populations to about 15,000/acre when planting early, but maintain the usual 10,000/acre when planting late. Further, whilst the application of 400 lbs./acre of the fertilizer mixture might be profitable with early planting and higher plant populations, it is probably not worth while applying more than 200 lb./acre to later plantings and lower plant populations.

There has been much talk in recent years of applying far higher applications of inorganic fertilizers to the maize crop than had been previously contemplated. A factorial experiment was carried out at Gwebi this year to investigate the question on land of presumably high fertility; it had received 1,000 lbs./acre " B " Mixture (3:13:8) and 24 tons of compost/acre in 1952/53. Basal dressings of " B " mixture were applied at rates of Nil, 225, 450, 675, 900 and 1,125 lb.s/acre, whilst top dressings

of sulphate of ammonia were applied at rates of Nil, 250 and 500 lbs./acre. Yields ranged from 26 bags/acre with no fertilizer up to 38 bags/acre. There was nothing in the results to justify a high rate of basal fertilizer application, there being no significant increases at all. There was a suggestion that a dressing of 250 lbs./acre of sulphate of ammonia at six weeks might be useful, but this was not proved. The experiment will be continued on land coming out of ordinary green manure and with a less involved experimental design.

A randomized block trial was carried out in the same area as the experiments described above, using four double hybrid strains in comparison with Southern Cross and Hickory King. Yields ranged from 30.7 to 37.5 bags/acre, the advantage of hybrid over open-pollinated maize demonstrated at Gwebi in a 35 acre field demonstration last year being again apparent, with an increase of 5 to 6 bags/acre in favour of the hybrid; 52 DH 59: DH 59 gave a significantly higher yield than 52 DH 32, the strain used for commercal planting on the College Farm.

Observation plots of summer wheat, fodder barley, tepary beans, fodder beet and cotton were grown.

Veld Management

Sufficient knowledge has now been gained to provide a reasonable basis for the management of veld on the College Farm.

A growth experiment on veld was continued, using the " clipping " technique to stimulate grazing effects. Yield, crude protein and root weights were studied. The fact that moderate grazing for the full growing season appears to be the least harmful of all the clipping treatments is of great interest and importance. There is no evidence that rests given during periods of active growth are beneficial.

A supplementary experiment provides further information regarding the relationship between growth and defoliation. Crude protein and moisture determinations were made on bulked samples for all treatments of the Latin Square at all harvesting dates. After burning in October, 1954, the recovery growth will be measured in the 1954/55 season. The results to date further confirm the belief that rests which include a period of active growth only do *not* increase vigour.

A further experiment confirmed the results of an earlier growth experiment (1952/53); fertilizing resulted in marked yield increases while the effect of burning was slight and of no practical importance. In another experiment with various applications of N.P.K., singly or in combination, a noticeable change is taking place in the botanical composition of the plots which have received nitrogen. *Setaria Sphacelata*, in particular, appears to be favoured, whilst the erstwhile dominants, *Hyparrhenia Filipendula* and *Andropogon Schinzii* are dying out.

The former carrying capacity trial on veld was converted to a fertilizer/grazing experiment. The fertilizers used were given by Central African Fertilizers Ltd. The object of the trial is to measure the production and changes occurring in veld used intensively. Sussex Shorthorn steers were used, the mean live weight being 857 lbs. at the start. The treatments include a range of stocking rates, fertilizer applications and grazing periods. There appears to be a lessening of response with high nitrogen level applications, which may be bound up with the physiology of the dominant grasses present. There is strong evidence that species changes will occur which may result in increased production. Beyond these comments it is not proposed to report further on this very interesting experiment at this stage.

In conjunction with the grassland experiments a useful start has been made with the measurement of soil moisture by an electrical resistance method. The biggest drawback to field calibration of the apparatus under Rhodesian conditions appears to be the rapid drying out of the surface soil after the termination of the rains.

The experiment to investigate the value of indigenous veld in milk production was continued, whilst the value of grazing the dairy herd on a legume, into June, was demonstrated.

Animal Husbandry

The trial in which 24 steers of different breeds were fed on the same level of nutrition was concluded when the animals were exhibited at the Salisbury Show and slaughtered and graded at the Cold Storage Commission. A full report on the trial will be published in due course.

The gradings of the four groups of six animals each were:—

Breed	*Grading*	*Av. c.d.w. lbs.*	*Av. price* £ s d
Aberdeen Angus	.. 5 R.B. Imp. ..	572	.. 44 3 11
Hereford	.. 2 R.B. 4 ,, ..	596	.. 42 7 7
Afrikander	.. 3 R.B. 2 ,, ..	571	.. 41 10 8
	1 Imp. (measles)		
Indigenous	.. 2 R.B. 3 Imp. ..	536	.. 36 13 11
	1 ST. A.		

Experimental work is being developed in the Poultry Section. In the Battery the influence of a prolonged " day ", through artificial lighting, on egg production is being studied. The production of eggs is being compared under different systems of management, including deep litter, battery and movable folds on grassland. Recently a feeding trial to compare munga and sorghum meal was commenced; egg production will be the criterion. Three hundred cross-bred chickens are being raised, first in cold brooders and then in folds for the last experiment. A comparison of mortality in rearing will be made with another batch of chickens raised under infra-red lamps.

General

The work on mechanical handling and storage of grains was carried a stage further with the development of a blower to fill maize storage tanks from ground level, without manhandling of bags.

The study of Methylene Blue tests in the College Laboratory led to the introduction of phosphoric acid treatment of utensils in the dairy. A large number of moisture determinations were made in connection with grain and grass samples. A survey of the new African Village area was carefully carried out, whilst in the library a careful check was made of all books and plans made for reclassification using the Davey Decimal System.

College Council

The College Council, Mr. D. C. Lilford (*Chairman*), Lord Acton, Major H. G. Mundy, Mr. G. R. A. Johnson, Mr. H. H. Cole and the Principal (*ex officio*), continued to take an active interest in College affairs.

HENDERSON RESEARCH STATION

Agricultural Research

It is already clear that diversified ley and crop farming is possible in the maize-growing area of Mashonaland, and that gross revenue can be greatly increased by the introduction of productive livestock and leys, without any reduction on the maize grown for sale. The incorporation of perennial grass leys provides at the same time a means whereby soils can be stabilized against erosion and improved in fertility and workability.

General Farming Conditions

The somewhat patchy November rainfall was followed by regular rains until April, and both crops and pasturage were good. During the winter of 1954, unusually cold weather was experienced.

Army Worms attacked certain portions of the lands in January, but did little damage to the maize. They consumed large amounts of young growing grasses, causing a reduction in yields of herbage.

Research in Systems of Farming

The past year has brought much information to light on the subject of ley crop rotations.

Nine-Year Rotation with Silage Leys

This unit was extended by one year to a ten-year cycle, with 40 per cent. Napier silage ley, 40 per cent. maize and 20 per cent. legumes for hay or concentrate feed. This was done in order to provide legume hay to balance the large amount of silage and at the same time to maintain the maize grain crop that can be obtained on a maize green manure rotation. The sequence of crops on this rotation following four years of Napier is maize, maize, legume, maize, legume, maize. This has been arrived at as a suitable forage sequence because with last year's normal rainfall, the maize production target of 15 bags to the acre was exceeded by 5 bags. This allows of diverting 25 per cent. of the maize crop for animal feeding. It was found that a Napier ley ploughed under can be followed immediately by maize provided adequate nitrogenous fertilizers are applied. Finally, it is possible to interplant the last year of maize in the cropping sequence with Napier which yields a full crop in its first year of growth.

It was found also, that 10–15 tons of silage per acre can be cut in January from the Napier and that it is scarcely necessary to ensile the second cut in March or April because it can be used as excellent green grazing from April to June and even later, during which time the veld has deteriorated in feeding value. This constitutes a great saving in costs. In mid-winter the tall stalks which remain can be cut down leaving a thick mulch on the surface of the ground which stops any tendency to pulverization or blowing. It is now clear that in a normal year this ten-year rotation, coupled with sufficient veld to provide summer grazing and some spring and autumn grazing in addition, can maintain one head of productive livestock for every acre of arable land. On the basis of yields obtained over the past three years the following targets for production have been set for this rotation which consists of ten sections of 7 acres each, totalling 70 acres.

28 acres of Napier cut in January to give 280 to 320 tons of silage autumn grazing and cut green feed.

28 acres of maize to give 20 bags per acre or 560 bags of grain.

420 bags will be for sale,
140 bags will be for feed.
2 tons stover per acre, 56 tons for feed.

14 acres of legume for hay at 2 tons per acre to give 28 tons for feed.

It was not possible in the past year to allocate a herd of livestock to this unit but these feeds were produced and were used for critical experiments in livestock feeding. The unit now has its own herd of 20 Jersey cattle to give 15 lactations of 600 gallons and 50 Mashona type beef breeding cattle. The animals will all use the veld in summer. The Jersey herd in the autumn will graze on veld and green Napier. For the winter and spring these animals will have 100 tons of silage, 20 tons of bean hay and 20 tons of stover giving a daily ration of 50 lbs. silage, 10 lbs. bean hay, and 10 lbs. of stover.

The above year-long ration is sufficient to provide maintenance requirements and up to one gallon and at times more, of milk. The 140 bags of maize or purchased concentrates of equivalent value are available for feeding to cows producing milk in excess of one gallon at the rate of 3 lbs. of concentrates per gallon. The Mashona breeding herd of 50 will remain on the veld through autumn and winter and have 180–220 tons of silage, and 36 tons of stover to see them through the winter and the spring.

The fencing of seven veld fields has been completed. A dairy is nearing completion and the necessary equipment has been assembled. This unit is now under the control of one man and complete records of labour requirements, production and costs can now be kept.

Heavily fertilized rotation with silage leys

This was originally planned as a 14 year rotation with three years of silage ley heavily fertilized. The yields of heavily fertilized Napier have proved to be an embarrassment, in that it is difficult to balance the very large amounts of winter feed with extensive veld grazing in summer. It is realized now that before heavily fertilized silage leys can come into use, high producing summer and autumn pastures are needed so that suitable livestock can be run on high quality feed from pastures and leys throughout the year. Work is in progress on summer grazing leys in the pasture section, but has not progressed far enough to permit of their incorporation in this unit at the present time. For this reason this rotation is being maintained as a source of silage and other fodders which are being used for critical experiments on winter feeding by the animal husbandry section. It is also clear that this rotation of 14 years' duration, as originally planned, is too complex for general application, and a more simple system is being studied. Particularly important is the need for more knowledge on rapid and cheap establishment methods of ley grasses and the admixture of legumes with them under conditions of high fertility.

Sandveld Leys

Originally two rotations were planned, one using Star grass for summer grazing and the other using Napier for silage and winter grazing, under conditions of moderate fertilization. Funds did not permit of the application of fertilizers as originally planned. The Star grass was not sufficiently aggressive, but the Napier grew well. As Napier is showing promise of providing a valuable winter grazing supplement on sandveld without heavy fertilizer applications, and as there is a pressing need in the Native Reserves for an improvement in winter grazing conditions this unit is being developed for this purpose. The area of Napier is being extended to 20 acres which will be used as a winter supplement for a herd of Mashona cattle grazing on 200 acres of veld all the year round.

These units are being developed by means of continuous consultation between members of the pasture, animal, crop and conservation sections. Available information has been used in the planning of the units, and problems which need solution from the subject of critical experiments which are carried on independently outside the unit by the sections concerned. The work in progress in the different sections is outlined below.

Pasture Research

Nursery Work

The introduction of new species of grasses and legumes has been reduced to a minimum in order to develop work on the use of promising species already available. Several acres of legumes were sown for seed production and sufficient seed obtained

to initiate field scale trials during the coming season on the following varieties. *Crotalaria intermedia*, *C. Paulina*, *Vigna vexillata*, *V. parniflora*, *Desmodium discolor*, *D. tortuosum*, *Teranmus uncinatus*, *Glycine javanica* (var. Citrus) and *Cajanus indicus*. Seed of several of the above legumes have been sent to selected seed growers for multiplication.

Production Studies with Napier

The experiments which were laid out in 1950 have continued to show the importance of balanced fertilizers in the culture of Napier Fodder. Yields ranged from 3 tons to 30 tons of green material per acre, depending on treatment, and this showed a slight reduction from the 1952–53 season. Whilst the deep cultivation and subsoiling treatments in the absence of nitrogenous fertilizers did not increase the yield, it is thought that annual deep cultivation may maintain yields in the presence of balanced fertilizer. This aspect, together with the possibility of the cultivations inhibiting soil improvement, will be investigated.

Pasture Establishment

Success was achieved in the establishment of a 23 acre Giant Rhodes grass pasture. This was sown from seed in heavy Tatagura soil by using cotton planter plates, planting in 3 feet rows at a seeding rate of 2 lbs per acre, in January, 1954. The Rhodes competed successfully with the annual weeds, was mown and the rows cultivated. The plants were not killed by the unusually heavy frosts. At sowing time 200 lbs. of mixed phosphates per acre were applied broadcast.

Kavirondo sorghum, sown from seed in 3 feet rows and interplanted with velvet beans, germinated and grew well to a height of 8 feet yielding a silage crop.

Creeping Makarikari was established by planting roots in 6 feet rows, and the legumes *Teranmus uncinatus* and *Glycine* (var. Citrus) were broadcast giving an excellent establishment which has survived the winter drought satisfactorily.

A grazing type of Nyasaland Napier is being multiplied by root planting in 6 feet rows. It has become evident that for successful and rapid Napier establishment, the planting of roots can give a crop in the planting year, but this method is laborious and costly. Cheaper methods include the laying of 6 feet canes in furrows opened and and closed by a Ferguson tobacco disc ridger. It is important that these canes be free of stalk borer, and exposed to the sun for a minimum time after cutting, and be kept free of weeds. The use of weedkiller sprays in this connection shows promise. A cheap and rapid method is to underplant 2 feet high maize in 7 feet rows with cuttings of three nodes not later than January. By the time roots have formed and the plants are established the maize has matured without suffering from competition.

Star grass planted from roots at an espacement of 3 feet $\times$ 3 feet in the 1952/53 season formed a dense cover this season and, in addition to giving a mid-season cut of silage, provided good early autumn grazing.

Three acres of Setaria Kazungula and 3 acres of Rhodesian Sudan grass, planted with a wheat drill at the rate of 20 lbs. of seed per acre late in the 1952/53 season, established well, provided a mid-season silage crop and late autumn grazing.

Dryland Forage and Pasture Legumes

Field scale sowings in January of *Crotalaria intermedia*, *C. Paulina*, *Desmodium discolor*, *D. tortuosum* *Glycine javanica* (var. Citrus) *Teramnus uncinatus*, *Vigna vexillata* and *V. parniflora* were successfully achieved by hand sowing in 3 feet rows. It is clear that the quality of seed at present is not such as will permit a low seeding rate per acre. Innoculants specific to these legumes have been cultured by the Plant Physiological Institute of the Pretoria University and are to be used in the current season.

Winter Pastures

Four different mixtures of grasses and legumes have been established on a field scale.

(*a*) Grass and Clover mixture. 3.816 acres.

4 lbs. *Phalaris tuberosa*	per acre
10 lbs. Alta Fescue	..
7 lbs. Perennial Rye Grass	..
7 lbs. Italian Rye Grass	..
4 lbs. Broad Red Clover	..
3 lbs. New Zealand Wild White Clover	..

The above seed was sown broadcast on a fine seed bed and rolled in with a Cambridge roller. Initial fertilizer applications were $\frac{3}{4}$ ton of agricultural lime, 400 lbs. of mixed phosphates, 100 lbs. muriate of potash and 50 lbs. of ammonium sulphate per acre. Subsequent dressings included 300 lbs. of ammonium sulphate and 200 lbs. of nitro-lime per acre. Strip grazing with beef steers, controlled by an electric fence,

was employed and the animals remained on the pasture continuously. 183 grazing days and a live weight increase of 230 lbs. per acre were recorded up until September 30th and grazing is still in progress. Over the first season the pasture established itself rapidly and was ready for grazing six weeks after sowing. After light frequent irrigations during the establishment, weekly irrigations of 1 inch were sufficient until the advent of the hot season. Irrigations were then increased to $1\frac{1}{3}$ inches per week. Overhead spray irrigation was used and proved satisfactory.

The first season's results are very encouraging but it has yet to be seen whether the pasture will be truly perennial. Even if it is not, it is clear that the annual mixture of Italian rye grass and Red clover is suited to these areas as a winter irrigated pasture.

(*b*) 1.2 acres of Kikuyu and clovers, and

(*c*) 1.2 acres of *Paspalum dilatatum* and clovers were planted in August. The establishment of all species is good but annual weeds are proving troublesome and have to be checked with frequent mowings.

(*d*) 3 acres of Napier fodder planted in 3 feet rows was established and irrigated through the winter.

The pasture provided grazing for ten cows and eight calves prior to the heavy frosts. Grazing with beef steers was started in mid-August and up until September 30th; 74 grazing days and a live weight increase of 79 lbs. per acre had been recorded. Grazing is still in progress.

Animal Husbandry

The Animal Husbandry Section was established on this station some 18 months ago. Since then progress has been made towards developing facilities and obtaining suitable stock for research purposes. Among the developments are winter feeding pens to accommodate 200 head of stock, and fencing has been erected to provide summer grazing for the experimental animals and a digestion unit is under construction. Experimental animals number about 200 beef stock and a recently acquired herd of 30 Jersey females.

Research in the first instance has been directed towards investigating the various types and phases of intensive beef production with special reference to the utilization of winter feed from ley pasture.

The various experiments are described briefly below.

1. A trial with four-year old steers to test the feeding value of Napier silage and the effects on their growth of various levels of concentrate supplementation. This trial has been completed and the results published. The indications from the trial were that:—

(*a*) Napier silage, when used as a winter fattening ration for 1,000 lbs. steers provided little more than maintenance.

(*b*) The profitability of feeding this type of animal was very low indeed. Systems of feeding using large amounts of concentrate supplements appeared, however, to give the best return.

(*c*) Carcase analyses revealed that the change in composition of the carcases of these mature bullocks was largely one of increased fat content. Very little additional muscular development was noted.

2. With a basically similar design, *i.e.* Napier silage as the basal ration with various types and intensities of supplementation, a further trial with ranch bred weaner steers was started and will be completed next year.

Progress in this experiment has been satisfactory. The first groups of animals were slaughtered at 20 months of age. It is hoped to slaughter the remainder in two groups at 2 years and 3 years of age.

3. Breeding Stock: Two breeding herds of Africander and Angus are being used in a trial to:

(*a*) explore the nature of growth and the efficiency of nutrient conversion during the various phases of intensive beef production.

(*b*) to study the possibilities of winter calving in this area.

This is a long term trial and no results can yet be given. Calving percentages so far have been fairly good—while the growth of the calves has been very satisfactory.

4. Dairy Husbandry: A suitable plan for experiments in milk and cream production has been drawn up and approved. Bearing in mind the feeds available from the unit three winter feeding levels are to be imposed with high, medium and No concentrate supplementation. Life time production records of milk, butterfat and fertility are to be kept to determine the effects of these feeding levels on production.

5. A digestion unit now under construction is to be used for the determination of the nutritive value of the forage flow throughout the year under a ley farming system in this area. It will also form an important part of the efficiency studies described above.

Field Husbandry

Hybrid Maize

During the 1953/54 season the following acreage was planted to hybrid maize.

	Yield
30 acres, single cross N3–14–9 × A5–7–6	128 bags
30 acres N9–9–5 × T4–92–1	29 bags (T4–92–1)
2 acres Inbred bulk M9–9–5	12 ,,
1 acre Inbred bulk A5–7–6	6½ ,,

Maize Rotation Experiment

The object of this experiment is to compare three systems of continuous cropping Rotations. Rotations consist of:—

1. Maize continuous with maize stover mulched.

2. Legume cut for hay followed by maize with 5 tons of dung per acre followed by maize. All maize stover is returned to the land and 40 lbs. nitrogenous fertilizer per ton of stover.

3. Maize alternating with green manure; all maize stover removed. Last year was this experiment's first year. No significant results are available yet.

Hibiscus Variety Trial

Four varieties of Hibiscus were treated for the production of fibre. The following varieties were tested: Rosella, Cuban Hibiscus, Egyptian and Hibiscus ex S.A. The following results were obtained. Spacing used was 1 foot rows × 6 ins. in the row.

Variety	*Yield of fibre lbs. per acre*
Cuban	1,988
Egyptian	1,556
Hibiscus ex S.A.	2,257
Rosella	2,015

From this table it can be seen that a ton of fibre can be produced per acre.

Castor Bean Spacing trial

This experiment consists of three spacings as follows:—

3′ × 18″, 3′ × 12″, 31′ × 6″. There were no significant differences in yield as a result of the different spacings. Variety of Castor Bean was Mauthers Dwarf, which gave a very poor yield.

Hybrid Variety Trial

Four double hybrids (52 DH 32, 52 DH47, 51 DH40, 52DH51) were tested with two commercial varieties; Salisbury White and Hickory King. The Four Double Hybrids gave better yields than the two commercial varieties. Double Hybrid 51 DH 40 gave the best yield.

Legume Hay Trial

This trial. to compare five legumes for the production of hay, gave the following results.

Variety	*Yield per acre in tons*
Velvet beans	2.5
Soya bean	2
Dahl	3.5
Cowpea	1.5
Sunnhemp	3

The Dahl hay yielded the best but the stems were much too woody. The sunnhemp gave the best yield of good hay.

Erosion Control Research

Carried out by officers of the Department of Conservation and Extension

Research was started 12 months ago on the determination of how much water runs off ploughed lands under different crops and on different slopes has shown in this

first year that large amounts of water and soil are lost to crops each year even from contoured lands. These figures are in the nature of a trial run.

		Maize	*Sunnhemp (green crop)*	*Napier fodder*	*Sunnhemp (legume hay)*
6½% Slope	Run-Off	30%	40%	8%	40%
	Soil Loss (tons/acre	4.0	23.4	1.4	40.1
4½% Slope	Run-Off	28%	27%	14%	25%
	Soil Loss (tons/acre)	2.5	7.5	1.7	6.9
3% Slope	Run-Off	19%	30%	2%	29%
	Soil Loss (tons/acre)	2.8	5.9	0.4	9.6

(Annual rainfall 36.1 inches)

More than half of the soil loss during the year took place as a result of one particularly heavy storm in January when 5.3 inches fell in under three hours and the intensity at times reached almost 8 inches per hour.

Great differences, in the region of 300 per cent. were found in the experiment to determine the effect of length of slope between contours on the amount of soil washed away. In this first year in which figures are comparative only 7 tons of soil was lost from an acre on a 90 foot slope, whereas 24 tons was lost from a 180 foot slope.

The work, which was started on an intermediate loam type of soil, is to be repeated on deep red soil and later on sandy soil. An office and field laboratory and storeroom for soil samples have been built, and it is to be expected that information, vital to the agriculture of the country, will be forthcoming in the next few years.

Estate Section

An area of 100 acres was planted to maize by the Estate Section for rations, and gave an average yield of 12 bags to the acre. An area of 150 acres was planted to legumes, of which 60 acres was turned in for green manure. The rest was used for legume hay.

Work commenced on the building of a new compound to provide accommodation for 16 families. A washroom has also been completed. A new mill room, with internal maize storage capacity of 400 bags and a brick grain silo for 900 bags are nearing completion. A large implement shed and a new dairy and store room for stock feeds are under construction. A new maize floor was built, and considerable work on the maintenance of existing buildings was done.

All the roads on the station were graded and repaired as far as facilities would permit. A firebreak was burnt along the western edge of the farm and the station was secured from runaway fires during the 1954 winter.

Experimental Fish Farm

A freshwater fisheries industry can provide very great quantities of cheap food for both humans and livestock, and the Experimental Fish Farm has now reached the stage where the research and production programme laid out some years ago can be embarked upon in the coming season.

The last stage of the building up of the experimental fish farm is now being entered upon, and this will be completed as soon as finances allow. The piping of borehole water and the installation of electricity is in progress for the newly built laboratory, offices and buildings, and the last 1½ acres of research ponds with furrow connections are under construction. Storerooms are being built. The construction of the Experimental Fish Farm has taken approximately 3½ years. Of the whole scheme, as originally planned, only the fry production ponds and some additional buildings still remain to be constructed.

Interest in fish culture is growing steadily and it has been impossible to meet all demands for advisory work. Numerous organizations were addressed on the subject of fish culture, farmers were visited and advised by letter on fish culture, stocking, fry production, etc. Two introductory courses of one week were held for altogether 48 conservation and extension officers on the subject of fish culture.

Observations of dams and rivers were made on the same lines as in previous years, mainly in connection with visits to farms.

Research work was checked by the unusually cold winter. Experiments are in progress on the subject of mixed stocking in relation to stocking density, fertilizing and artificial feeding on a commercial scale, based on production figures mentioned in the last year's Report. The experimental feeding of fish to pigs and poultry has been started on the Animal Section.

The first experiments on rice paddy fields showed a production of approximately 3,000 lbs. rice (Matabelewhite variety) per acre and a fish growth in paddy fields during five months from a three weeks old fry to a fish of 2–3 ozs. in weight, or about 60 lbs. per acre.

Grasslands Research Station

Grasslands Research Station at Marandellas is the Regional Agricultural Research Station for the sandveld of the high-lying north-eastern part of Southern Rhodesia. Attached to it is the sub-station at Melsetter which serves the Eastern Districts.

Weather

The rainfall for last season was 26.13 inches, about 8 inches below normal. It was poorly distributed and there were long dry spells after February 25th, by which date 24.38 inches had fallen. As a result of the poor rains, yields also were generally poor.

Ground frosts were recorded almost daily during June and July, the average ground minima for those months being 30.3°F and 27.9°F respectively. The maximum screen temperature reached or exceeded 85°F on nine days—six in October and three in November.

In October, 1953, a new meteorological station, called Grasslands, was established in the Lysimeter block. This station will form the central station for all future meteorological work. The meteorological station at Digglefold was closed down at the end of December, 1953.

Development of the Station

During the year very considerable progress has been made in the development of the Station. The basic system of paddocking required to enable a sound system of veld management to be imposed on the whole of the Station is almost completed. Most of the old arable blocks have been refenced and the fencing of the new series of veld management experiments is well underway. In all, many miles of new fencing have been erected, mostly from material salvaged from old and unwanted fences. A number of concrete grids have been built.

Works has continued on the realignment of roads and the construction of fire breaks. The Station is proud to be able to record that no important run-away fires have occurred during the past three dry seasons.

Approximately 150 acres of new land have been stumped and broken for cultivation. This will make it possible to put down to permanent pasture some of the worst of the old arable blocks.

Considerable changes and improvements to the office block have been effected and a new house was completed early in the year. The urgently needed implement shed and workshop has been completed. Work on the African compound has continued, several houses having been built, two wells sunk and the whole area cleared to parkland.

Irrigation

Pilot Scheme

A four-acre pilot scheme for the investigation of winter pastures under spray-irrigation was completed during the year. The first seed mixtures were drilled in April. Grazing commenced six weeks after seeding.

Forty-acre Scheme

A large dam on the Hunyani has been completed. This will hold upwards of 86 million gallons when full and will cover about 40 acres. It is intended to supply the water required for 40 acres of irrigated land, most of which will be devoted to winter pastures for the production of milk. Work on the preparation of this land for irrigation is well advanced.

Overhead irrigation in the Vlei

In order to investigate the possibilities of overhead irrigation from springs in the vlei a clay-cored tank has been constructed into which the flow from a strong spring can be diverted. V-notch gaugings have been carried out on this stream since the beginning of May, 1954.

Sub-surface Irrigation in the Vlei

In co-operation with the Department of Conservation and Extension an ambitious sub-surface irrigation scheme is being developed in the Grasslands Vlei.

To overcome the limitations on utilization imposed by the naturally great local and seasonal variations in the height of the water-table, a system of subterranean pipes designed to take excess water away and to supply it where it is needed has been installed over 50 acres of vlei. The work is nearing completion on 15 acres and a cropping programme will be commenced during the coming season.

Crops and Fodder Conservation

Ten acres of Southern Cross maize was planted and yielded 12½ bags to the acre.

Velvet beans were planted later than in the previous season and although fair crops resulted they did not compare with crops obtained from October plantings in previous years. Some of the beans were ensiled together with grass. Some were dried.

Mixed munga and beans were grown for silage and provided good crops. The mixture suffers from the disadvantage that if the beans are allowed to bulk up and provide a fair contribution to the crop then the munga tends to be too far advanced for high quality silage.

A very small quantity of Star Grass hay was made, but proved a hazardous undertaking despite the low rainfall. About 600 tons of silage was made from Star Grass, Bambatsi Panicum, Kazungula Setaria and Munga. Wherever possible velvet beans were mixed with the grasses and this addition markedly improved the protein content.

Some high-quality feed was produced by the Slade-Curran grass drier.

Water Relations

Lysimeters

After a uniformity trial lasting three seasons it was decided to compare the percolation under different vegetative covers. Accordingly, on December the 19th, two lysimeter plots were planted with maize, four with Star Grass, and two were left bare. The percolation from the maize lysimeters averaged 15.38 inches of rainfall, from those under Star Grass 14.33 inches and from those left bare 20.28 inches as at September the 26th. The two bare lysimeters were still running at the end of September; all others had stopped by April the 7th.

The natural cover on seven of the eight run-off plots was removed on December the 17th, six of these plots were planted to maize and one to velvet beans. Total run-off was again negligible, the most recorded was 0.23 inches of rainfall from one of the maize plots.

Fertilizer Experiments on Grasses

The grass experiments in particular suffered from the shortage of rain, and this should be borne in mind in considering the results presented.

Star Grass

As in past seasons, the increase in dry matter yield of Star Grass was more or less in proportion to the amount of ammonium sulphate applied up to 900 lbs. per acre, the mean yield increasing from 910 lbs. of dry matter per acre where none was applied to 4,970 lbs. per acre where 900 lbs. was applied.

Superphosphate, applied at the beginning of the season at 300 lbs. per acre, increased yield by 25 per cent. in the first cut of the two cuts taken, and by 7 per cent. in the second cut.

Potassium chloride, at rates of 0, 75, 150 and 225 lbs. per acre, gave mean yields of 2,300, 2,450, 2,500 and 2,400 lbs. of dry matter per acre respectively. Agricultural lime, at rates of 0, 1,000, 2,000, and 3,000 lbs. per acre, caused a steady depression in yield as the amount was increased—where no lime was applied the mean yield of dry matter was 2,920 lbs. per acre, where 3,000 lbs. was applied it was but 1,820 lbs.

Star Grass cut twice, thrice and six times a season and fertilized with from 0 to 2,500 lbs. per acre of ammonium sulphate gave seasonal yields as follows, the yields being in terms of lbs. of fodder dry matter per acre. Protein and fibre yields have still to come.

	Lbs. of ammonium sulphate per acre per season					
	0	500	1,000	1,500	2,000	2,500
1 cut/season	1,730	3,530	6,490	8,700	9,360	11,250
2 cut/season	570	2,720	4,110	4,750	6,040	7,180
3 cut/season	783	3,230	3,230	4,630	5,420	6,050

Bambatsi Grass

Bambatsi Grass in 3 feet drills cut twice during the season, in a new experiment, gave a mean yield, in the first cut, of 1,160 lbs. of fodder dry matter per acre where no ammonium sulphate was applied and 1,300 lbs. where 300 lbs. was applied. Where a dressing of 450 lbs. was given, the yield was 1,200 lbs. In the second cut, with a repetition of the same quantities of ammonium sulphate, corresponding yields were 2,025, 2,460, 2,830 and 2,690 lbs. per acre.

In the first cut the mean content of crude protein was increased from 12.9 per cent. to 15.3 per cent. by the use of 450 lbs. of ammonium sulphate per acre. In the second cut corresponding figures were 4.8 per cent. and 6.3 per cent.

Three hundred lbs. per acre of super/raw-rock phosphate applied at the beginning of the season increased yield by 20 per cent. in the first cut, but gave only a negligible increase in the second cut. Lime at 1,000 lbs. per acre, and muriate of potash at 100 lbs. per acre had no apparent effect on yield.

Naper Fodder

Naper Fodder cut once, twice and thrice a season gave mean Dry Matter yields of 17,750 lbs., 12,580 lbs. and 8,930 lbs. per acre respectively. Protein and fibre yields have still to come. In the same experiment, mean Dry Matter yields at spacings 6 feet, 9 feet and 12 feet between rows were 13,456 lbs., 13,535 lbs. and 12,255 lbs. per acre respectively. With 1,000, 2,000 and 3,000 lbs. of sulphate of ammonia per acre mean Dry Matter yields were 13,040 lbs., 13,410 lbs. and 12,805 lbs. per acre respectively.

Swaziland Finger Grass

On a Swaziland Finger Grass lawn it was found that 200 lbs. of ammonium sulphate per acre produced as great an improvement in the appearance of the sward as did larger amounts. Superphosphate also, at 200 lbs. per acre, improved the appearance of the sward, but muriate of potash, at 100 lbs. per acre, had no apparent effect, while 1,000 lbs. of lime per acre thinned the sward and thus marred its appearance.

Crop Experiments

Maize

In fertilizer experiments with maize, it was found that ammonium sulphate, in amounts ranging from 0 to 875 lbs. per acre, increased grain yield in all cases up to 625 lbs. per acre, but did not do so in all cases above that level. In one case the mean yield was increased by 9.0 bags per acre (from 14.0 to 23.0 bags) by the use of 500 lbs. of ammonium sulphate per acre.

Responses to phosphate were found to be complicated. First, response was found to depend upon the method of application. Where 125.0 lbs. per acre of superphosphate was banded near the maize rows at planting time, the mean yield was 17.0 bags, and larger dressings produced no increased yields. Where 125 lbs. was broadcast on the surface and lightly hoed in, the yield was but 9.9 bags. By increasing the broadcast dressing to 875 lbs. per acre, yield was increased to 16.2 bags—a yield still a little short of that secured with 125 lbs. applied in bands.

Second response to superphosphate was found to depend upon plant population. With populations of 6,970 and 8,712 plants per acre, no consistent benefit from increasing dressings of superphosphate was secured. With populations of 11,616 and 17,424 plants per acre, however, mean yield increased by 9.1 bags as the dressing of superphosphate was increased from 0 to 750 lbs. per acre.

No benefit was found with dressings of muriate of potash in amounts ranging from 0 to 225 lbs. per acre—a result in keeping with chemical analysis of the soil, which showed the available potash to be inadequate for the needs of the crop.

In a variety trial, hybrids from the Salisbury Experiment Station outyielded the open pollinated varieties tried. Thus, at the ends of the range, Southern Cross gave a mean yield of 9.9 bags per acre and hybrid No. 52 DH 6 gave 19.1 bags per acre.

Wheat

A fertilizer experiment (NPK) with summer wheat failed, largely, it is thought, through unfavourable weather. A fertilizer experiment (also NPK) with winter wheat grown on vlei land shows much greater promise despite damage from frosts. Yields are not yet available.

Legumes

Lucerne

An experiment has been started to study effects of row spacing and dressings of potash on the establishment, yield and duration of dryland lucerne. No measurements have yet been made.

Another experiment with lucerne was designed to test effects of various macro- and micro-nutrients. Establishment and growth were poor. At harvest it was found that the mean numbers of plants on plots that had received no lime and those that had received 2,000 lbs. per acre were 139,000 and 202,000 plants per acre respectively. Plots that received 7 lbs. of zinc sulphate per acre gave 125 lbs. of dry matter per acre, whereas those that received none gave 80 lbs. With 7 lbs. of copper sulphate the effect was much the same. Manganese sulphate at 14 lbs. per acre, and sodium molybdate at $\frac{1}{8}$ lb. per acre had little effect separately, but in combination they increased the yield from 75 lbs. to 130 lbs. per acre.

Variety Trial

A trial consisting of 17 varieties of lucerne, seven varieties of *Glycine javanica* and 11 other promising legumes were down in rows for trial under dryland conditions during January and February, 1954.

Of the lucerne varieties Du Puits, Flamande, Lombardy and Sevelra were the most promising. In a recent count to record their ability to withstand the dry season the following legumes appear to have survived better than others—Nomad, and Du Puits varieties of lucerne, the Fort Jameson strain of *Glycine javanica*, *Phaseolus semierectus and Dolichos hosii*.

Grass Legume Pastures (*Dryland*)

Investigations concerning the introduction of legumes into grass pastures are continuing. The quarter and half-acre grass legume plots, now in their third season, were grazed by three-year old steers. Grazing commenced on the 2nd December, 1952. The following table illustrates the results obtained.

Mixture	*Grazing days acre*	*Lbs. nitro lime per acre*
½ acre *Panicum makarikari* (upright var:) .. .. .. + *Glycine javanica*	132 ..	300
½ acre *Panicum makarikari* (creeping var:) .. .. .. + *Glycine javanica*	192 ..	300
½ acre *Nyasaland Napier Fodder* .. .. + *Glycine javanica*	168 ..	300
½ acre Bun River Setaria .. .. + *Glycine javanica*	216 ..	300
½ acre *Cenchrus ciliaris* .. .. + *Leucaena glauca*	168 ..	524
½ acre *Cenchrus ciliaris* .. .. *Leucaena glauca*	150 ..	524

The steers were on the plots for 114 days.

The average liveweight production per acre was 459 lbs., the average liveweight gain per beast was 303.4 lbs. and the steers gained an average of 2.66 lbs./day.

All plots received a basic dressing of 400 lbs. superphosphate. The glycine showed considerable improvement over the previous year. The *Laucaena glauca* proved very difficult to graze in a mixture. This is because of its extreme palatability, the animals never giving it a chance to grow and thus severely limiting its contribution.

Legumes in Star Grass

Korean Lespedeza: Twenty-four acres of established Star Grass pasture was overseeded with Korean Lespedeza. Inoculated seed was drilled at approximately 8 lbs. to the acre after discing. A very good establishment was obtained and despite a season marked by several critical droughts the Lespedeza survived, flowered and produced a crop of seed.

Trifoliums and medicagos: Twenty-four acres of very good Star Grass pasture were overseeded in the same way with two different legume seed mixtures.

Mixture A, consisting of one part by weight of Chilian Red Clover, one part of New Zealand White Clover and two parts Crimson Clover, was drilled at approximately 10 lbs. to the acre over 12 acres.

Mixture B, consisting of *Medicago sativa*, *Madicago Lupulina*, *and Medicago Denticulata* was seeded at 10 lbs. per acre over the remaining 12 acres.

Although excellent germination was obtained in both, the seedlings perished during the first of the droughts experienced during the season. Red Clover and lucerne proved to be the most drought resistant of the species tried and some survivors of each are still to be found.

Rhodes Grass. Dahl: Although the 24-acre Rhodes dahl pasture was badly damaged by frost during the winter, 1953, a high proportion of the dahl plants recovered. This pasture was grazed by the dairy herd for part of the summer. During the winter the dairy herd remained on the pasture from 11th May until the beginning of August. From 11–18th May the cows obtained full maintenance from the dahl, which continued to provide some maintenance until early June.

The pasture was again badly frosted during the winter, 1954, and much of the dahl is now dead. A new block of 24 acres was seeded to Giant Rhodes and dahl during the season.

Glycine javanica was successfully introduced into a 12-acre stand of *Setaria Kazengula*. The plants grew well and made a useful contribution to the mixture which was cut for silage. This glycine shows every sign of improving during the coming season.

Five species of glycine and some *Dolichos hosii* were planted between the rows of a stand-of Napier Fodder last season. Observation to date indicates that the poor rainfall and the dry summer has proved too much for the plants, and there are few survivors.

Seed Pastures

In January, using cotton seeder attachments in a maize planter, 8 acres of *Katambora Rhodes Grass* and 4 acres of "*Grasslands*" *Cenchrus ciliaris* were drilled, and using a Planet Junior 5 acres of *Bambatsi Panicum* were drilled. In all cases excellent germination and establishment were obtained and the newly seeded stands have come through the dry season remarkably well.

Twenty-four acres of *Giant Rhodes Grass* were drilled by maize planter, fitted with cotton seeder attachments. Germination was poor but the stand is good enough to be left to thicken up.

Irrigated Winter Pasture

A Pilot Irrigation Scheme required to provide some of the basic information needed for designing the projected 40-acre irrigated winter pasture scheme was seeded during April, 1954, to various grasses and clover mixtures. It is on newly-broken land which has been well prepared and well fertilized. The basic fertilization was one ton of agricultural lime, 400 lbs. superphosphate and 200 lbs. muriate of potash per acre. The mixtures were drilled with a Planet Junior planter at 12 inch spacing between rows.

The pasture mixtures cover approximately 4 acres while ¼ acre is being used as a nursery for observing the growth of various grasses and clovers.

Three basic mixtures were used:—

(1) Tall Fescue and White Clover (Alta and K31).

(2) *Phalaris arundinacea* and White Clover.

(3) *Paspalum dilitatum* and White Clover.

All mixtures contained Italian Ryegrass and Chilean Red Clover as quick growing vigorous annuals to give grazing whilst the perennials develop and in addition some mixtures contained *Phalaris tuberosa* and others Danish Cocksfoot. In all, seven different mixtures were used at different seeding rates.

Because the land was new and contained a lot of unbrokendown organic matter a nitrogen deficiency became obvious at an early stage. This necessitated two applications of Nitrolime which had a deleterious effect on the clovers.

The pasture was grazed with sheep for the first time six weeks after planting. Grazing with Shorthorn weaners was commenced 13 weeks after establishment. Six weaners (400–450 lbs.) were kept on for three weeks and during the last two weeks of this period the average daily liveweight gain was 3 lbs. per head. After three weeks rest the pasture was re-stocked with three weaners and this initial stocking was rapidly increased to ten weaners, which the pasture was able to support on a 21-day rotation. Approximately the same gains in weight were obtained.

On the 29th September the steers were removed and grazing with dairy cows was commenced. This is continuing and very encouraging results are being obtained which will be reported on more fully later.

In addition to the actual use of the pasture, much valuable information is being gained concerning the behaviour of the pasture mixtures used; the method of irrigation; the quantities of water to be applied and also concerning the application of fertilizer and the grazing management.

Vlei Pastures

To investigate the possiblity of utilizing sub-surface moisture in vleis for establishment of winter pastures several beds were planted to grass/clover mixtures during July, 1953.

During the 1953/54 rainy season the temperate grasses grew very little while the clovers flourished. In spite of a relatively low water-table this past dry season and vigorous competition from *Cynodon dactylon*, clovers are persisting well in some parts. Nile Grass and White Clover have formed a very good mixture.

During March, April and May, 1954, several areas were ploughed and planted to oats undersown with White Clover, from which two light grazings were obtained. The clovers are not well distributed but seed which has not germinated, due to the dryness of the soil, may do so with the first rains.

Bitter Lupins were sown and germinated very well but have been ravaged by game. Neither Egyptian Clover nor Sanfoin planted under oats have proved of any value to date.

Cutting of Fertilized Veld

At the beginning of the 1953/54 season it was found, in a fertilizer experiment on natural grassland, that much of the grass treated in the previous season with 900 lbs. per acre of ammonium sulphate and some with 600 lbs. per acre, was dead. With a repetition of these dressings during the 1953/54 season, such grass as remained grew well, but could not make good the loss that had occurred. Mean yields, in the first cut, amounted to 980 lbs. of dry matter per acre, where the first half of the 900 lbs. dressing of ammonium sulphate was given, as compared with 1,280 lbs. where none was applied. The yield of forbs on the other hand, (mainly *Dolichos*, *Commelina* and *Eriosema*, spp.) was greatly increased by the dressing of ammonium sulphate, from 380 at 0 to 830 lbs. of dry matter per acre at 450 lbs.

Super/raw phosphate, at 300 lbs. per acre, had little apparent effect on the yield of the grasses, but increased that of the forbs somewhat, and muriate of potash, at 100 lbs. per acre, likewise. Lime, at 1,000 lbs. per acre, had little effect on the grass, but depressed the yield of the forbs by 19 per cent.

At the second cut, time would not permit of separating the grasses and the forbs. The mean dry matter yield of herbage was 550 lbs. per acre where no ammonium sulphate was applied, and 1,300 lbs. per acre where 900 lbs. per acre was applied. The depressive effect of lime was found again in the second cut, but no significant effects were found in the case of phosphate and potash.

Grazing of Fertilized Veld

A study of the productivity of veld grassland in terms of cattle grazing-days under four levels of nitrogen fertilization and of the effect of the treatment on the composition of the sward was commenced during the year.

The experiment consists of 12×2 acre paddocks in which four treatments are replicated three times in randomized blocks. Grazing began on the 20th November, 1953.

The following table summarizes the results obtained during the first season.

Results 1953/54

Treatment	*Grazing days per acre*	*Lbs. liveweight production per acre*	*Av. gain/day for 2 steers over 150 days*	*Lbs. unconsumed residue*
No fertilizer	50	90	1.85	1,558
300 lbs. N + PK	66	121	1.92	3,913
600 lbs. N + PK	86	167	2.07	5,839
900 lbs. N + PK	86	177	2.19	5,093

Continuous Grazing of Veld

In December, 1946, a trial was started to study the effect of continuous grazing at three different rates of stocking on veld grassland. The area chosen was actually free of M'sasa and M'nondo.

Three groups of ten steers each were grazed in paddocks of 40, 60 and 80 acres and for the first six seasons the paddocks were stocked in the growing season only. Since May, 1952, the paddocks have been stocked continuously except for the 40-acre paddock which was destocked from 14th–28th October, 1953, when the group weight loss reached an average of 200 lbs./beast. Three new groups were put into the experiment on the 5th May, 1954.

In the 40 and 60 acre camps the grass has been greatly reduced in vigour and some areas have been almost denuded and encroachment of *Lopholaena coriifolia* is proceeding at an alarming rate. In the 80 acre camp the effects of the grazing are similar but not so severe as yet but washing of soil has become bad and sand is accumulating at the bottom of the slopes.

Fixed Season Grazing of Veld

This experiment was started to study the effect of grazing on veld grassland during certain fixed seasons of the year and to complement similar work at Matopos and Nyamandhlovu.

Grazing of the experiment started in November, 1953, and one grazing cycle has just been completed.

Isolation Transect

This is an ecological study to show the effect on the veld of (*a*) heavy grazing continued over periods of years, varying from 1 to 15: (*b*) protection from grazing of veld which has previously been subjected to periods of heavy grazing.

Grazing started at the beginning of the 1952/53 season. Two series of plots have now been grazed heavily at frequent intervals for two seasons. Two plots have been grazed heavily for one season and protected for one season. Two more plots have now been closed after two seasons grazing. The two plots protected after the 1952/53 season grazing have made good regrowth and show no visual differences in botanical composition from the ungrazed corridor.

Tree Poisoning Studies

The third and fourth series of treatment were applied in January and April, 1953, respectively. Final observations of results of these treatments will be made during November, 1954.

Veld Management Trial

After a year's rest the first of the four-year burns was carried out on the 20th October. An excellent burn was obtained. The paddocks will be restocked early in January.

Livestock

Dairy Herd

The dairy herd maintained a high level of production with an average milk yield of 28.6 lbs./cow/day. During their 300 day lactations, the 12 mature cows produced an average of 9,912.5 lbs. of milk testing 3.4 per cent. butterfat.

Shorthorn Herd

The Shorthorn breeding herd continued to improve. Thirty-two cows were put to the bull, resulting in a calf-crop of 21 calves, with an average birth-weight of 62.5 lbs. A bull has recently been imported for the herd, and was used for the first time during the season.

Sheep

The policy of upgrading the existing sheep to the German Merino has been pursued. In October, 1953, the cross-bred ewe flock (Black Head Persian × Dorset Horn) was mated to a German Merino ram and the resulting lambs have been outstanding. Cross-bred ewes were used because of their superior milk supply. There was some variation between lambs from the half-bred ewes ($\frac{1}{2}$ Black Head Persian—$\frac{1}{2}$ Dorset Horn), and the three-quarter-bred ewes ($\frac{3}{4}$ Black Head Persian—$\frac{1}{4}$ Dorset Horn). Lambs from half-bred ewes weighed 87.9 lbs. at 184 days, and lambs from three-quarter-bred ewes wighed 70.0 lbs. at 182 days. The best lamb weighed 78 lbs. at 16 weeks and when slaughtered at 254 days yielded a carcase of 69 lbs. cold dressed weight and dressed out at 58 per cent.

A small flock of Black Head Persian ewes has been mated to a German Merino to compare the growth of their lambs with those of the half- and three-quarter-bred ewes.

Milk from Grass

During the past season the dairy herd was used to study the production of milk from grass alone. Accordingly no concentrates were fed to the dairy herd from January the 18th to April 3rd. The grazing available was not of as high a quality as in previous seasons as the pastures had been oversown with legumes and nitrogenous fertilizers were withheld until mid-January in order to give the legumes every chance to become established. This situation was aggravated by a very poor rainfall and attacks of army worm.

There was a rapid loss of body-weight in early December before the concentrates were reduced; this can only be ascribed to the change from winter feeding to summer grazing, as cows advanced in their lactations lost as much weight as the newly calved animals which could be expected to lose body-weight. This loss in weight was made good during January whilst concentrates were being reduced.

From December to March the average daily milk yield fell from 31.7 to 23.9 lbs./cow. However, during February and March, one cow, with no loss of body-weight, yielded 41 lbs. of milk per day on grass alone.

The effect of not feeding concentrates towards the end of summer resulted in the milk yield dropping rapidly and the cows entering winter in poorer condition than is normal, a heavier feeding had to be resorted to in order to bring the cows back into condition.

This work will continue during the coming season to obtain further information about the value of heavily fertilized leys for milk production.

Throughout the season all pastures on which the dairy herd grazed were sampled before and after grazing, in order to obtain some measurement of the nutrient intake of the herd. The results of this work cannot be presented as yet, as they have to be correlated with milk yields, and as protein analyses are not complete.

Beef from Grass

During the summer three-year-old Africander steers were run on fertilized pastures and made good liveweight gains. One group grazed on 2 acres of small plots of grass and legume mixture gained 2.66 lbs./head/day over 114 days. These plots produced 459 lbs. of liveweight gain per acre, which over such a short summer period is extremely high. Another group of similar steers grazed with the dairy herd on Star Grass and Rhodes Grass/Dahl leys and gained 2.64 lbs./head/day over 119 days. At the end of the summer the steers were all in forward condition and ready for final fattening in yards.

Mineral Supplementation

A trial in which indigenous and indigenous-×-exotic steers received salt and protein supplements terminated in May with the slaughter of the steers at 4½ years old. The results obtained show that there was no significant difference between treatments.

In earlier trials, with Sussex and Shorthorn steers, a considerable response to salt was obtained. In last season's trial, the lack of response with indigenous steers may be due to their adaptation to tropical conditions, especially as regards heat tolerance, and thence to their lower requirement of salt in their diet.

A similar trial has been arranged to compare the responses of Sussex, Africander and Native cattle to the feeding of salt.

General

Seed and Root Distribution

Supplies of grass roots and seed are still eagerly sought by farmers and some 2,400 bags of grass roots were issued during the year. Although the total issued was less than the previous year it is encouraging to note many new names amongst recipients.

A total of 73 packets of seed was distributed to farmers, I.C.A. Nurseries in Southern Rhodesia, and to Research Institutes in Australia, Trinidad, Tanganyika, Kenya and Basutoland. This is an increase in number of recipients and a much greater volume of seed.

Agricultural Shows

For the Salisbury Agricultural Show this Station prepared an exhibit entitled "Forage Flow" in support of the theme of the centre-piece in the Agricultural Hall. This section attracted a large number of interested farmers who were able to discuss problems with the number of staff in attendance.

Visits to Native Reserves

During the past year there was an increase in the number of requests from the Department of Native Affairs for advisory visits mainly in connection with stocking rate assessments in Native Reserves. Nineteen Reserves were visited.

Visitors

During the year well over a thousand visitors were received at the Station; these included a number of distinguished visitors from overseas and other countries in Southern Africa.

Two large Farmers' Days were held, one at Grasslands and one at Melsetter. The attendance at the Grasslands Farmers' Day exceeded 400 people, while just on 200 were present at Melsetter.

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Melsetter Pasture Sub-Station

Introduction

The unseasonal weather conditions experienced during the past year presented an excellent opportunity for studying the permanency and success of the established pastures on the Station. The rainfall for the year was 32.07 inches, just over 13 inches below the 49-year average for Melsetter Village. There were long periods of drought aggravated by high day temperatures. Newly-established pastures were affected by the heat and young seedlings rapidly succumbed. Despite the difficult season results on the Station have been good. Both Kikuyu and *Paspalum dilatatum*, combined with White Clover, have withstood the climatic conditions remarkably well.

Dairy Unit

The dairy herd of 23 Jersey cows and followers was used to study the production of butterfat from permanent and established pasture without resorting to the feeding of large amounts of concentrates.

Throughout the year the herd was grazed on established and permanent pasture composed as follows:—

(1) *Dryland pasture.* Kikuyu and *Paspalum dilatatum* with and without New Zealand Wild White Clover, and Napier Fodder with and without *Glycine javanica.*

(2) *Irrigated pasture.* Mixtures of exotic grasses with New Zealand Wild White Clover and Chilean Red Clover.

On all pastures grazing was controlled with an electric fence, and during the dry season grazing on the irrigated pastures was limited to 1½ to 2 hours per day, because of the small area available. Even so, the use of this small acreage of irrigated pasture resulted in a big saving of concentrates, and improved the production of every cow. From June to September each cow was fed about 50 lbs. of Napier-Glycine silage per day. When no grazing was available from the irrigated pastures 3 to 6 lbs. of concentrates had to be fed according to production.

Livestock

The Jersey cows showed a great variation in their ability to convert bulky fodder into butterfat. It is evident that some of the cows have not the inherent capability of making the best use of the high-quality herbage provided. The bulk of the herd is comprised of a good type of Jersey cow, but it is necessary that a well-bred bull be obtained so that his progeny might improve on the production of the present herd. Records of three daughter-dam comparisons indicate that the first bull used on the unit did not improve upon the production of the foundation cows.

The herd was tuberculin tested during the year. There were no reactors.

Other Pastures

Fifteen other grasses which had been promising under nursery conditions were tested on a field scale under grazing. With the exception of Star Grass these grasses did not combine with the more recumbent White Clover, and nitrogenous fertilizer had to be applied. The tests indicate that the grasses tried did not compare favourably with the Kikuyu-clover and Paspalum-clover pastures, which have proved their worth over the last four years.

Veld Management Studies

Experiments have been done to study the effects of burning, and burning and grazing in the control of *Smithia thymodora-Pteridium aquilinum* scrub. Results show that—

(1) Burning is essential to scrub control.

(2) A burn every two years is desirable, and should take place after the first good rains in spring.

(3) Mowing is the best method of scrub control where practicable.

(4) Where the veld is grazed it is best to burn at the end of the winter after the first good rains, rest the veld for the first half of the season, and graze during the second half.

Station Development

Additions have been made to the existing shed and store rooms, and work was recommenced on the Technical Assistant's house.

During the coming season it is hoped to increase the dairy unit to 48 acres with 8 acres of irrigated pastures.

Rhodes Matopos Estate

Housing

The housing position continues to be unsatisfactory. Two members of the staff were obliged to live at the hotel at different times during the year. At the moment there are nine bachelors in the Mess, and should any of them decide to get married the position will become critical.

Climate

The season started off well with ample, but well-spaced rains. These ended abruptly rather early, however, and the veld suffered considerably as a result. Most of the crops were good. Generally speaking the winter was fairly mild but some extremely cold snaps were experienced. 19.90 inches of rain were recorded at the office.

General

A very successful series of small Farmers' Days were held towards the end of the growing season.

The exhibit at the last Bulawayo Agricultural Show was a departure from the usual exhibit in that all branches of the Department were merged. The theme of the exhibit was " Farming Zones " and all branches combined to illustrate the activities of the Department in connection with farm planning in different areas.

Numerous talks were given by the officer in charge at farmers' meetings. An article on " Plant Indicators " by the Officer in Charge was published in the *Rhodesia Agricultural Journal* during the year.

Animal Husbandry

Development

During the period under review considerable progress was made with the large number of items to be completed in the next three years. Two new cement reservoirs were built on Westacre Creek, five miles of new fencing was erected on Lonsdale Farm and existing fencing and watering points kept in repair.

The fireguards at Lucydale, Irene and Collaton were completed so that 18,000 acres of grazing are now fully protected against veld fires. At Lucydale an additional 70 acres of virgin land were brought under cultivation.

Cattle Breeding

An analysis of the data collected on the first cross progeny of the long term cattle breeding experiments, which have been in progress on this Station since 1938, was completed and submitted for publication. The results obtained clearly indicate that there is little, if any, advantage in selecting superior breeding stock from favourable conditions of feeding when their progeny are expected to produce under adverse conditions of food supplies as obtained locally on free range.

Large scale experiments are therefore now in progress to determine to what extent beef production can be increased by selecting for greater efficiency of production under prevailing conditions of free range. At the beginning of the year a large number of bull calves of various breeding were selected from the different beef herds on the station and when ready for service they will be progeny tested for their ability to transmit their desirable characteristics.

Nutritional Studies

In order to determine whether the low calving percentages recorded in beef herds on free range can be increased economically by feeding breeding stock supplementary winter feed, three groups of 25 cows each, with calves at foot, were fed different maintenance rations from the beginning of June.

It will be necessary to repeat these experiments over a period of three or four years before an accurate estimate can be made of the influence of feed on calving percentages, but at this stage it may already be pointed out that the calves which received the supplement are vastly superior in growth to comparable groups of calves on veld grazing only.

Sheep Breeding

The studies to develop smooth-coated mutton sheep, adapted to Rhodesian conditions, are progressing favourably, and a number of ram lambs of different breeding will shortly be progeny tested for their ability to transmit their mutton qualities.

Also an experiment is in progress to determine whether March lambs can be reared economically on home-grown feeds so as to reach slaughter weight before the rainy season in November when growth is retarded by parasitic infestations.

The results obtained so far are very promising and indicate that depending upon the breed the slaughter age of lambs can be decreased from the normal slaughter age of 11 months to 7 months by feeding small amounts of additional maize silage and bean hay.

Dairy Research

A preliminary investigation is being carried out to determine the influence of green feed on the composition of milk. At the same time the accuracy of different lactometers for doing physiological work is being tested out against gravimetrical methods.

Field Husbandry

Crop Trials

Variety, Spacing, Time of Planting and Fertility trials were conducted on sorghum, millet, maize, legume, oil and fibre crops.

The main features of the results from these trials are summarized below:—

The dwarf sorghum variety 5,140 proved superior to established varieties in grain yields on clay and sandveld, giving 2,826 and 2,598 lbs. grain/acre on clay and sandveld respectively. This is being issued for farm trials next season.

The ensilage sorghum variety Ribbon Cane 5,151 outyielded maize millet and Napier fodder on both clay and sandveld. This is being issued for commercial growing next season.

The confirmation by a second test crop that compost or kraal manure should be applied direct to a maize crop and not to the preceding legume crop. Two applications of 5 tons/acre in consecutive seasons is more efficient than 10 tons applied in one season.

On a trial to assess the effect of kraaling cattle on arable sandveld before planting, cattle at the rate of two beasts/acre gave no significant increase over the control; three beasts per acre increased maize and millet ensilage yields by $1\frac{3}{4}$ to 2 tons/acre.

The trial to assess the effect of supplementing natural rainfall deficiencies by flood irrigation gave increases of 50 to 100 per cent. with sorghum and maize ensilage, grain sorghum, maize grain and legume hay. Water was applied at the equivalent of 6.2 inches. in eight applications.

Fertilizer trials with millet on sandveld land showed the maximum fertilizer dressings to give significant increases to be:—

S Ammonia	300 lbs./acre
Superphosphate	100 lbs./acre
Muriate of Potash	50 lbs./acre

Millet spacing and time of planting trials showed that very close spacing (9 inches × 6 inches) gave the higher yields. November planting at all spacings resulted in yields of over $2\frac{1}{2}$ times the ensilage yields from December and January plantings.

Eleven varieties of Castor bean averaged 850 lbs./acre on a late planted variety trial on clay soil with only 4 inches of rainfall after date of planting.

An investigation into 25 imported potato varieties showed the variety Great Scot to be significantly better than Up-to-Date. (*See* also R.A.J. October 1954.)

Crop Introductions

One hundred and thirteen sorghum varieties were tested, including 81 from Argentina and 27 from Tanganyika. Of these, 20 were retained for selection and multiplication next season.

Forty-one maize varieties were tested and six showed promise as breeding material. These have been retained for in-breeding next season.

Other introductions include male sterile sorghum from Texas which failed to germinate either in the introduction plots or in the greenhouse. Twenty-nine wheat varieties, 11 oats and five barleys, none of which have yet been harvested being winter introductions.

Plant Breeding

Sorghum : Two hundred and forty-two Inbred sorghum lines were grown and selected for ear row planting. Of these 109 were introduced since 1951 and are not yet sufficiently uniform to be used as crossing parents. Seven trial crosses were made from parents originally of Haakdoorn and Hagari stock. The sorghum 5,140 came top in grain yield trials and will be released in limited amounts next season.

Maize : Eighty-three Inbred lines from 39 parents were grown for selection. Six Hybrid Yellow varieties were tested planted and failed to outyield Sahara in grain. They withstood very dry conditions but proved disappointing in proportion of grain to cob.

One top-cross was promising, but failed to outyield Sahara by 20 per cent. the silage was also less abundant and it was not considered sufficiently good to release for grain trials.

Millet : Eighty-two millet varieties were planted for selection. All but 11 of these have been inbred since 1951 or later and are not yet uniform. A selection of a dwarf proso strain is of interest as a quick grain variety for sandveld and is now being issued for trial on farms next season. Two other short types with heavy heads are also showing uniformity and should be ready for farm trials next season.

General

Development of irrigation facilities to the nursery and breeding plots, new fencing, laying out of roads, expanding the seed store was completed.

A large amount of advisory work was carried out by letter and through the Department of Conservation and Extension. Apart from the hundreds of farmers who visited the Field Husbandry work during the season, many telephone enquiries were received and talks were given to farmers' meetings.

Pasture Research

Development

A considerable amount of development work has taken place during the year. This includes the construction of a tractor shed and storeroom, and an office for the Technical Assistants. Concrete floors have been laid in the implement sheds, three storm water culverts have been built, a new cattle weighbridge, crush and kraal have been erected, the old workshop has been enlarged and concrete feeding troughs have been built in the nursery and Two Tree Kop kraals. A windmill has been erected in the Maleme paddock and a new water tank and drinking trough near Experiment 37. An electric motor has been installed at the silo pits and a hammermill at the Nursery.

About 43 miles of firebreak/road have been graded and the road verges have been mown. This includes the construction of about three miles of new road. Approximately 15 miles of fire-break have been burnt.

The irrigated nursery has been completely relaid and planted to grass/clover pastures and lucerne. The beds are fenced into half-acre blocks. The old Makarikari pasture was fenced during the year so that it could be grazed.

The compound paddock at Two Tree Kop has been sub-divided and several experiments fenced.

About 130 tons of hay were cut during the year and about 150 tons of grass silage were made.

Veld Management

The veld management experiments continue to yield valuable information.

It becomes more and more obvious that if veld is to be correctly managed a sound knowledge of the principles involved is necessary. Once these principles are understood and appreciated it is possible to devise systems of management suitable for almost any conditions. The most important principles of veld management are:—

(1) The stocking rate must be correct. It is obvious that this will vary from year to year, depending on the rainfall, and it has been found that while an area may be safely stocked one season the same intensity of grazing may lead to disastrous overstocking the next year. The stocking rate should be adjusted so that in a year of average rainfall about 30 to 40 per cent. of the total bulk of grass produced during the year remains uneaten at the end of the dry season.

(2) Frequent summer rests must be provided if the veld is to remain in good condition. The required frequency of these rests varies, but a safe rule to follow is that the lower the rainfall the more frequent should be the rests. In the same way clay soils require a greater frequency of rests than the sandy soils.

(3) Active measures have to be taken to reduce the density of existing bush and to control further bush encroachment. Poisons such as arsenic, power paraffin, diesoline, 2.4.5.T and 2.4.D have been employed in this connection. Some of these, notably arsenic and 2.4.5T have proved effective in killing bush but the cost of application is high. Hand clearing is effective but is also expensive. The use of goats appears to be promising but these have to be carefully managed if damage to the grass is to be prevented. Thus far, by far the most promising method for large scale bush control appears to be the use of fire. A really good burn, at the end of the dry season once in three or four years, is extremely effective in thinning out existing bush and in controlling further invasion.

Work in the past showed that the value of veld hay, apart from its value as a feed reserve during times of drought and apart from the fact that mowing allows a slight increase in carrying capacity, is no greater than the value of veld grazing. Animals, penned during the dry season and fed nothing but hay, fare no better than animals on grazing throughout the dry months. Experiments continued throughout the 1953/54 season bear this out.

In an attempt to obtain a feed higher in quality than hay, veld silage was made during the last two growing seasons. This experiment has proved interesting. It has shown that it is possible to make fairly good quality ensilage from veld grasses but that in some years it is likely that the proportion of leaf to stem may be very low. This results in a low quality silage which is difficult to cure without an excessive amount of over-heating and drying out. It has also shown that animals derive very little, if any, more benefit from veld silage than they do from veld hay.

From these two experiments it would appear that, provided ample grazing is available, there is no point in going to the additional expense of hay-or silage-making if the conserved feed is to be fed to steers. The increased carrying capacity allowed by mowing does apparently not balance the expenditure involved in producing hay or silage.

The experiments with urea, started in the 1952/53 season and continued throughout the present dry season, confirm that animals can be carried through the winter with very little loss of weight at a comparatively reasonable expenditure. The steers at present in the experiment were approximately 18 months old at the commencement of feeding. The best group, that receiving a ration consisting of urea, molasses and cob meal gained weight from 446.7 lbs. on June 15th to 449.2 lbs. on October 5th while during the same period the control group dropped from 445.0 lbs. to 410.8 lbs. It is probable that both groups will lose weight from the present time until the commencement of the rainy season.

Two new experiments on veld, one a fertilizer experiment, and the other designed to measure the accumulation of old grass in undisturbed veld, were laid down during the year. No results have been obtained from these as yet.

Lysimeters

The run-off studies, which have now been in operation for two seasons, continue. So far, the only large differences in run-off have been obtained from the plots which are kept completely bare of all vegetation. On these plots, as was anticipated, the loss of both water and soil has been excessive. It is unlikely that differences between the other treatments will be apparent for some years. It was originally intended that the lysimeters would be planted with grass and the treatments imposed during the coming growing season, but it has now been decided to continue with the calibrations for at least one more year. This is necessary because there is still a fairly large variation between the percolation in different lysimeters.

Established Pastures

The grass and legume seeding trials continue and some good results are being obtained. Some 14 acres of *Bambatsi Panicum* were drilled on one of the farm lands with only partial success, owing to unfavourable soil and climatic conditions. Work has been initiated in selection of a good seed producing strain of *Zhilo Penicum*.

Very promising results are being obtained from grass/clover pastures which were planted in March. By the end of September half an acre each of a *Phalaris arundinacea*/clover and Tall Fescue/clover pasture had each provided about four hours grazing a day for two cows for over two months. At that time a great deal of grazing remained untouched and it was anticipated that the cows would be carried easily until the rains. These pastures provide sufficient feed in three to four hours for the production of two and a half gallons of milk.

A new fertilizer experiment on Napier fodder was planted during the year and the first fertilizer dressings are to be applied during the coming season. Cuttings will be taken each time the Napier reaches a height of 4 feet. The old fertilizer experiment, which commenced in 1949, was unsatisfactory because cuttings were only taken at maturity. This was ploughed out at the end of 1953.

The silage variety trial which incorporated annual crops as well as perennial grasses was ploughed out at the end of the 1953/54 season. During the six seasons which the experiment ran Gold Coast Napier fodder produced as much total bulk as did maize and sorghum. There appeared to be no difference due to spacing amongst the grasses in so far as total yield was concerned but individual plants at the wider spacings were very much larger and healthier.

Another trial, discarded at the end of the 1953/54 season, was one in which Napier planted at inter-row spacings of 6 feet and 12 feet was grown with and without inter-row plantings of legumes. The legumes were turned in as green manure when the Napier was cut and the experiment ran for five seasons. No nitrogenous fertilizer was applied during this period. At the conclusion of the experiment very little difference between the treatments was apparent, but there was a slight tendency for the Napier to have benefited from being grown at a wide spacing with annual inter-row green-manuring.

The dry land lucerne has so far survived the present dry season but gives the impression that it is suffering more from drought this year than last. Hares, in spite of elaborate precautions, are keeping it grazed very short.

General

The co-operative experiments being run at the Mzingwane Government School and in various Native Reserves are running according to plan and are yielding valuable information.

New experiments that will be laid down during the coming year include an experiment to test the effect of heavy grazing on *Hyparrhenia* sandveld and two fertilizer experiments on sandveld and thornveld.

Poultry

Within the limits of the facilities available, progress has been made with the development of the poultry unit. A laying house for 500 birds has been erected and a brooder house to accommodate 1,200 chicks is under construction. Free range camps and summer shelters were completed.

Indications from a preliminary feeding trial are that sorghum may replace maize meal in poultry feeds. This work is proceeding. Advisory visits were less than normal. Ten articles on the Culling and Breeding of Poultry were published in the "*Rhodesian Farmer.*"

Nyamandhlovu Pasture Sub-station

Development

A large hay barn was constructed but needs extension to cope with all the hay cut in an average season. A house is under construction for the Pasture Research Officer.

Two new grazing trials were laid out on the black soil, involving nearly three miles of fencing. One is to study the effect of rotational grazing and burning and the other to study grazing this soil type at a heavier stocking rate.

New roads and firebreaks have been laid out, and some of the existing ones are being modified. Eight foot high fences were erected around the lands where trials are taking place on the growing of winter wheat. Ten concertina gates have been replaced with tubular steel ones to prevent cattle breaking through them as has happened several times.

Seven one-acre blocks were planted up to the most promising grasses to study them under field conditions.

Research

As with the previous season, the year under review has been considerably better than average, so that the results again have little bearing in practice and have to be interpreted with caution. Until such time as a succession of dry years is experienced again, it will not be possible to assess accurately the effects of the various systems of management nor the yields from the lands.

Results from several of the grazing trials were contrary to those obtained the previous season and indicate that for conclusive findings to be obtained, these experiments will have to run for a much longer period. On the Kalahari sands, systems incorporating burning for control of bush continue to give good results.

On the black clay soils, which are used in winter when the cattle have to be taken out of the Kalahari sand because of the danger of Umkouzaan (*Dichapetalum*) poisoning, cattle on the veld have again done better than cattle on hay. To date there has been no difference between cattle grazed at one beast to 10 acres or at one to 4 acres, but this may not apply in a poorer season. The first burns on the black clay gave good control of scrub Mopane and other small bushes; the setback was temporary, however, and it will require a succession of burns to judge whether this can be made permanent.

On the red sandy loams, the trial which is grazed continuously for three years out of four and then burnt, is still doing as well as the rotational grazing trial which provides fresh camps for the different seasons of the year plus a burn for bush control. This is encouraging news for those farmers who are not able to afford the expense of putting down sufficient camps at the outset for the rotational system. It is expected that the present parity will only be a temporary one and that as the trials continue the detrimental effects of continous grazing will become noticeable.

The correct stocking rate appears to be about one beast (large) to 20 acres on the red soils, where one quarter of the ground is set aside for burning each year.

Preliminary investigations into the carrying capacity of Couch (*Cynodon*) on this soil type shows that with a rainfall of about 20 inches, 6 acres may suffice to provide year round grazing per beast, a big step up from natural veld. Much further work requires to be undertaken into this important grass.

The hay versus winter grazing trial on the red soil is following the same pattern as last year in that grazing is proving superior to hay in winter. This is almost certainly only the case where there is a surplus of grass so that the animals can graze selectively. In most seasons, however, it should be possible to carry far more animals on hay than on the veld and this may offset the costs of mowing and the poorer grades obtained. The use of urea or other supplements may well change the whole picture but for the present no work along these lines is possible.

The introduction of silage, hay and concentrates from planted crops and pastures will cut down considerably the acreage required to maintain an animal over the dry season, and work is now in hand with a view to determining which crops to grow and what yields can be anticipated. Once this information is to hand it will be possible to calculate the ratios of arable and grazing land required for any particular set of circumstances. So far, Haakdoorn sorghum for ensilage, velvet beans for legume hay, Rustenburg or Early Hegari sorghum, or Bearded Inyouti, for grain, appear to be the best, but much more extensive trials, based on more normal seasons, will be necessary to obtain conclusive results.

This work is being done on the three soil types of the station: as one would expect, the black clay is providing the best returns and the Kalahari sand the poorest.

Napier fodder has done well again, both on the station and in the district, but it remains to be seen how it will stand up to poorer years. As so many farmers are growing it, and as it is playing a large part in their economy, it is felt that this station should do a lot of work on it so as to be in a position to give sound local advice.

Winter wheat was tried out again on the sand and clay soils, but on the former it was scorched off and on the latter it was eaten off by buck and birds. Kudu broke through the eight foot fence on several occasions—next year pieces of tin will be hung on the fence and an automatic birdscarer used (for both buck and birds). Also, the wheat will be planted earlier in an endeavour to get it to shade the soil before the rains cease.

In the couch paddock, a stand of a creeping legume, *Crotalaria pisicarpa*, was observed forming mats up to 50 yards across as a substratum to the couch. With a view to determining its palatability and effect on cattle, the dairy stock was turned in in April and they ate it avidly. There was no sign of any ill-effect on the animals, nor was the milk tainted, so that it would appear that this legume has a considerable potential once its management has been understood. The roots were rich in nodules which were reddish in cross section. A quantity of seed has been collected for trial and distribution.

Of the legumes tried in the nurseries, *Vigna vexillata* shows promise in Egyptian and Indian lucerne have done well without irrigation on the black clay.

On this soil type, a stand of Star P.279 gave spectacular growth this season. It had been planted the previous year from seed. Other grasses that have done well in the nurseries are the Zeerust and Chipinga strains of African Foxtail (*Cenchrus ciliaris*) the creeping and upright strains of Makarikari Panicum, Bambatsi Panicum, and Glencurrah Rhodes grass.

Much work has gone into the preparation and presentation of the data concerning the variation of the seasonal crude protein content of veld grasses occurring at Matopos, and it is hoped to have this published shortly.

Bird Control

Trapping and ringing of Queleas at traps set under water on the station, has been continued. Up to 200 Queleas per day have been caught in a single trap about 3 feet square. Further returns of rings have come in and indicate that movement on a north-south basis between Southern Rhodesia and Northern Rhodesia and Nyasaland is probably greater than originally suspected. Examination of skins show that the East African race comes down as far as Northern Rhodesia and possibly breeds there. Birds from Matabeleland also move across into Bechuanaland and down to the Limpopo basin, and as the Transvaal and Orange Free State birds also move up to this area, there is probably a complete interchange of populations so that our birds may range from the borders of the Cape and Natal right up to Nyasaland, and probably also across to South West Africa.

From work done elsewhere, it would appear that there is considerable hope that spraying of Quelea nesting or roosting colonies with Parathion or similar substances will give substantial kills. Such spraying would probably be best done from helicopters, but in small colonies certain fog generators may suffice.

Very little damage appears to have been done to crops this season, probably because of the good rains providing ample grass seed. Everywhere Queleas appear to be in smaller numbers than in past years, probably because they are more widely distributed owing to abundant surface water. There is, however, no cause for complacency, especially if the country hopes to become self-sufficient in grain production. The need for control measures will be even more urgent if large scale attempts are to be made to grow wheat.

Tuli Pasture Sub-station

Development

Progress throughout the year has been satisfactory and a great deal of further development has been done on the main block of 12 veld management experiments.

A house for the Technical Assistant and two small offices were built by the Department of Native Engineering. A further building was erected out of Native Development Funds for a meteorological observer.

All roads and firebreaks have been cleared of grass and graded and satisfactory anti-erosion work was carried out. A new approach road has been made.

Water supplies are far from satisfactory and more than half the experimental animals have to be watered by hand cart, the water being hauled from a source 2¼ miles away. Steps must be taken to improve the position.

Veld Management

The veld management experiments have been functioning for just over 15 months. the steers used are about 33 months old and weigh on an average 917 lbs.

There are five major veld management experiments, covering an area of about 1,620 acres and designed to supply information regarding stocking rates, systems of management, effect of fire and the relative merits of grass and browse plants.

It is reflected from cattle live-weight records that the only groups showing an appreciable dry season loss in weight are the experiments involving the heavy stocking rate of one beast to ten acres. Indications so far are that at the lighter stocking rates the steers receive maintenance requirements during the dry season till about the end of October. Last year a short but sharp drop in weight occurred during November but by the end of the month this loss was more than made up.

At the moment a tentative forecast of carrying capacity could be given as one beast to 25 acres.

Herbage Samples

In December, 1953, a start was made in the collection of six browse and two grass samples to be analysed for crude protein, crude fibre, CaO and P2O5. Samples will be taken monthly for a 12 month period.

Experimental records are based on observation, fortnightly steer weights, oblique fixed point photographs and aerial photography. An aerial survey was made of the entire Tuli Breeding Station.

Bush clearing

One hundred and eighty acres of very dense bush was cleared by hand labour. All trees with trunks greater than 4 inches were only felled at a point 6 inches from the ground, the rest of the woody vegetation was stumped. Timber was piled ready for burning. Records were kept of tree counts, output per labourer and costs.

Proposed Experiments

It is intended to put down three further experiments involving burning, more detailed ecological investigations and investigations to cover aspects of grazing with goats.

General

A total of 11.57 inches of rain was recorded for the season. A meteorological station was established as from the 1st August.

Approximately 100 visitors were shown over the Station during the year.

SABI VALLEY EXPERIMENT STATION

The 1953/54 season at the Sabi Valley Experiment Station was in general, good. Crops are better this year than last, more like those of the first year's work in the Valley. Rainfall was low; under 12 inches being recorded for the so-called wet season. River flow has been satisfactory with ample water at the pumps for irrigation. But the domestic water supply at the Station is causing real concern. The No. 1. well has become almost completely useless and the No. 2. well has reached a stage of critical depletion.

The airstrip has been completed and approved for use by both Civil Authorities and the R.A.F. transport service.

Maize

Crops progress has been satisfactory. The scheduled maize experiments were completed. Top yields from a field-type planting amounted to just over 27 bags per acre; the lowest yields from the same sort of planting came to 11 bags. Best responses have been from the use of nitrogen, where in one case additions of 30 lbs. of this element raised yields from 14–21 bags per acre. In another experiment the increase from the use of nitrogen amounted to 3 bags per acre, with multiple additions producing no greater yields than a single application.

In a hybrid variety test, with the Salisbury white strains, pronounced differences in capacity to yield under Sabi conditions were shown, but none of these hybrids is much better than yellow open-pollinated material grown in the Valley. The Salisbury hybrids are susceptible to local strains of rust, to a virus streak disease and all lodge very badly.

Maize showed no response on the Mopani Farm to drainage treatments; it is thought that in wetter seasons effects will be more apt to be evident. For the third season, maize planted flat has produced as well as maize planted on ridges, even though the early appearance of the ridge-planted material was better.

Cotton

Cotton did very well. The best yield again exceeded 3,000 lbs. of seed cotton per acre, with other production ranging from there downwards. The general average for the whole crop will be around 2,000 lbs. per acre. In one variety test, no difference between the three African varieties, Gatooma, Uganda and Barberton, could be demonstrated, at variance with last year's results where Gatooma was the best of the three. In another variety test of a preliminary nature, very pronounced differences appeared among new selections, but these must be further tested in detail.

The effect of moisture levels on cotton yields was not as pronounced as was expected, and verified last year's indication—that cotton under rather low moisture conditions appeared to produce slightly more fibre than under what was considered an ample supply. The difference was not statistically significant for either year however. As with maize, cotton planted flat did as well as that planted on ridges, even though the early appearance seemed to favour the ridge-planted crop. Dusting experiments showed that results were mostly due to DDT, and that heavy losses of up to 50 per cent. of the total crop resulted where insect control was not applied.

Alfalfa

Alfalfa continues to do well although the crop appeared to be less vigorous and luxurious at the end of last summer than it had the previous summer. Winter recovery has been good and it is thought that last year's unsatisfactory appearance may have been due to the very wet season. On the average the yield appears to be about 12 tons per acre per year. First year results from the variety tests indicated that the " India " strain produced the significantly highest total yield and that Hairy Peruvian and Hunters River were next with no difference between them in total yield, but that the Hairy Peruvian was cut twice more in the course of the year. This means that it produced a more even flow of forage. The " Morocco " strain was not nearly as good as the first three mentioned, and the South African material was an extremely poor fifth to the other four. Seed of the first three is being bulked as rapidly as possible. Rust still continues to attack some strains of alfalfa virulently. Alfalfa produced at the Station is being ground and sent to Matopos for feeding trials The earlier material submitted was not as high in protein as might be desired, but later material appears better.

Wheat

Wheat harvested from the rotation blocks in September, 1953, averaged 4.63 bags per acre. It is emphasized that last year's wheat was produced from unadapted seed under extremely unsatisfactory conditions. Production this year has been much better with some plots showing yields in excess of 20 bags per acre. The average yield from the Rotation Plots on the Acacia Farm this year is 9.2 bags per acre, and from the Mopani Farm 11.8 bags per acre. Results of the Rate-of-Seeding tests are as follows:—

Acacia farm					
seed at lbs./Acre.					*Mean yield bags/Acre.*
40	..	..	..	..	8.88
60	..	..	..	..	8.80
80	..	..	..	..	9.27 differences not significant
100	..	..	..	..	9.34
120	..	..	..	..	9.72
Mopani Farm					
lbs./Acre.					
60	..	..	..	..	11.31
80	..	..	..	..	11.72 Difference not significant
100	..	..	..	..	10.51
120	..	..	..	..	11.65

Wheat following green manure with additional nitrogen applied in the late piping stage produced a mean yield of 14.62 bags per acre, and wheat following a long fallow in the same experiment produced a mean yield of 13.88 bags per acre. The difference was not significant. From the date-of-planting experiments early yields were good, but yields from the late planted material were very seriously reduced on account of rust. Results from the variety tests were also interesting; one of the highest yielding wheats tested was a Sabi selection of unknown parentage which came from a single ear selected in the field two years ago, and labelled Sabi X-1. This may or may not be

a representative of a named variety but it is thought likely that it represents a casual hybrid and as such would be eligible for naming as a new strain. A very attractive type of wheat, which did well in preliminary tests, is one from Australia known as "26 A 14". It is a short stiff-strawed strain and appears to stand up, in small plots at least, much better than many of the others. From the large scale variety test between two varieties used on the Mopani Farm the results were:—

Punjab 8 A, mean of 8	5.3 bags per acre
Kenya Governor	6.1 bags per acre

About 5 bags of Pusa 4 and Kenya Governor, still the two best general varieties at the Station, were carefully hand-selected and hand-threshed for next year's planting season. Lodging continues a problem, and varieties as good as these must be found. Some seed has been obtained from Chisembanje of an unknown Nyanyadzi strain which stood up better than any others, even where Kenya Governor showed 100 per cent. lodging.

Miscellaneous

Last year the best mean yield of potatoes from the Rotation plots was 57 bags of 150 lbs. each per acre, the lowest was 49 bags. This was produced by second from imported seed. This year seed of new varieties imported from the Netherlands and being increased for testing on the high veld produced a top mean yield of 134.0 bags per acre, with the lowest yielding variety producing at the rate of 63.2 bags per acre.

Peanuts were again disappointing, with yields ranging from 2.8 bags per acre of shelled nuts for the poorest variety, to 8.2 for the best. It is not thought that peanuts will be at all adapted to production in most of the Sabi Valley soils.

Yields of sugar cane ranged from a low of 30 tons per acre to a high of 117 tons, with the harvest having been made about a month early. Sugar content averaged about 18 per cent. but it is thought that it would have been higher had the harvest been made at a later date.

Sorghum ranged in yield from as low as 2 bags per acre for a giant type to 12.5 bags per acre for the best dwarf type, Early Hegari. It is not thought that sorghum offers much as a potential crop for the irrigated Sabi.

No vegetables were grown experimentally, but they did well in the Station gardens, and a local Valley producer has shipped as much as, or more than all other winter vegetable production from the entire Eastern Districts, with apparently very satisfactory results.

Pineapples have done better than expected. Bananas are doing well. Citrus production promises much in the way of quality and quantity, and papaya are outstanding for quality and amount produced. Preliminary observations on figs indicate that they also may bear two very substantial crops per year.

Some stem rot was noted in a summer planting of sunnhemp in the past season, but none has been seen in any of the winter plantings. Experiments with *Crotolaria intermedia* continue but results have been disappointing up to date. Another *Crotalaria* which came in as an impurity in the *c. intermedia* seed is being increased and looks very promising. Fodder beets were satisfactory in a preliminary test and investigations on them will be continued. Napier grass has been produced in small quantities and does not appear at the moment to warrant a great deal of work.

Grain flax will continue to be studied. Continued efforts towards selection and improvement of all sorts of seed stocks for local use are being made and progress is reported for the maize breeding work. Nearly 100 new hybrid combinations produced out of season are ready for testing and about 60 new inbreds are in the second or third generation. Plots of Natal Yellow and Teko Yellow are ready for inbreeding in those strains. Indications are that it will be possible to produce an alternate winter generation of cotton in the Valley which should be of outstanding value in speeding up cotton breeding work in Southern Rhodesia.

Dairy cattle continue to do well; production has been very satisfactory and the condition of the cattle has remained excellent. Heifer calves, produced at the Station, are soon to come into production and have done very well indeed. Poultry has also performed satisfactorily. Consideration is being given to extending the animal husbandry experiments and work will be done with beef cattle and sheep.

In the area of technical research it has been found that all plastic syphons so far supplied have been most unsatisfactory. Rubber and aluminium syphons on the other hand are giving good results.

Internal drainage studies on problem areas show that slow water absorption and percolation is associated with shallow surface soils over deep compact subsoils of low pH. This condition was encountered where grasses seriously invaded older alfalfa stands, as well as on plots under crop cultivation. Work on chemical weed control in maize indicated reduced yields as a result of chemicals used, under the conditions of

the Sabi trials. Soil profile samples from Station plots are being collected for reference, and laboratory work has been confined to analyses of soil and plant samples from experimental plots.

Continued collapse of the infill over drains on the Mopani Farm has necessitated extensive and expensive maintenance and continues a problem in the management of these lands. Some farm-sized plots have been set up where it is hoped that information on the practical aspects of handling the Sabi soils on a farm basis will be secured. It is already apparent that very careful project planning will be required to ensure a substantial delivery of water to any portion of an irrigated farm; so that total time required for irrigation can be reduced to the absolute minimum.

The farm stores and equipment shelter have been completed and are satisfactory. The power station and electrical installation has also been completed. Electric supply has been erratic; in particular the Blackstone engines have been the source of much trouble. Construction on a forage drier has been commenced.

Clearing and stumping has also started at the Pilot Farm located near the Station.

There has been no change in ideas concerning the economic outlook or the income potential of the Sabi development from those expressed in last year's Report, except for the possibility that winter vegetables might be another very attractive source of cash income to Valley Farmers.

CHEMISTRY

General

The past year has seen a slight fall in the number of samples handled but this by no means nullifies the Chief Chemist's forecast that the amount of work, particularly as regards soils for advisory purposes, would increase, for the year has finished with a very considerable back-log of samples still awaiting attention. This back-log has been due partly to lack of staff (one member has been on sick leave for six months of the year) and partly to the fact that, as regards soil analysis, methods have been improved and a longer time is required for each. In addition lack of space is proving a limiting factor to the amount of work which can proceed at one time. It has therefore been necessary once again to streamline the method of working where soils are concerned and to divide the analytical work between three chemists whilst a fourth has spent his full time in collating results and preparing reports for farmers.

A notable advance in this part of the work has been the preparation of information sheets whereon farmers and others can give the information necessary for the chemists in concise form. This has done away with the letters, often vague and inessential in content, which, in the past so frequently necessitated further correspondence. In addition, the results of analysis and fertilizer and cultural recommendations are now transmitted on standard forms also together with a booklet, prepared by officers of the Branch, giving some explanation of the terms used and containing information regarding methods of application of fertilizer for various crops under various conditions. This system has proved most acceptable to the farmers and has saved a great deal of time and labour in the laboratory. Unfortunately, an enormous amount of clerical work has had to be done by the professional officers of the Branch and clerical assistance is urgently required.

The soil survey team has spent the field season on the west bank of the Sabi River. All members of this team are now fully trained and the work proceeded apace. It was not possible to carry out the full programme laid down at the beginning as unexpected differences were found from conditions on the East Bank and new problems arose which materially delayed the work. Further, transport difficulties also proved something of a hindrance and it is hoped that, before the next field season commences, adequate facilities will be provided to enable each officer to carry out his own sections of the work without the delays incident upon inadequate transport. In addition to the work in the Sabi Valley, one member of the team carried out a survey of the land commanded by the proposed high level canal on the left bank of the Hunyani River and a considerable area was covered and mapped despite a somewhat late start.

The new method of attacking the problem of small-scale irrigation schemes also came into force during the year. By arrangement with the Director of Conservation and Extension, a soil chemist, if and when available, visits each scheme personally, examines pits and reports upon the suitability or otherwise of the soil. Several such schemes have been so visited this year.

The Pasture Research work has again proved heavy and although fewer samples have been examined, more detailed analysis has been carried out on many of them. Although an attempt to ration samples has been made, the figure agreed on still appears to be rather high and, apart from the human element, working space limits the capacity for this section of the work.

As regards other research projects, the main advance has been made in the assessment of available nitrogen in soils by incubation methods. Good correlation is being obtained between the figures reached by this method and crop response in maize Further studies on phosphate and potash have confirmed the criteria previously obtained but all the work carried out, whilst producing valuable results, has pointed the way to further problems towards the solution of which a vigorous investigation is being taken up as limited facilities permit. Work has also been done on the nutrient uptake of maize and on the nitrogen content of rainwater.

Two demonstrations were arranged during the year on water analysis in connection with courses under the direction of Dr. Maar. Several talks were given by the Chief Chemist and members of staff to farmers and others and many visits were paid to the Research Stations in connection with the work in which this Branch is co-operating.

Laboratory Analytical Work

The classification of samples dealt with is as follows:—

Soils	1,809
Manures and Fertilizers	239
Farm Feeds	181
Waters	397
Vegetable Products	218
Limes and Limestones	9
Toxicological	484
Miscellaneous	334
Meats	11
Soil Survey	206
Investigatory and Research	680
Pasture Research	1,201
	5,769

In addition, 10 litres of standard caustic soda solution were prepared for the Dairy Branch and 210 litres of standard iodine solution for the Veterinary Department.

The list shows approximately the same number of samples as in the previous year but a much greater back-log has accumulated which has still to be worked off. Major increases have been in vegetable products and the wide variety of samples classified as miscellaneous. The number of soils actually analysed is approximately the same as for the previous year but it is here that the back-log is greatest, due partly to late arrival and partly to the introduction of improved and more lengthy methods. A considerable amount of time has been taken up this year with interviews with farmers, nearly 200 more having called than in the previous year.

Manures and fertilizers have shown a considerable increase, chiefly owing to the rise in interest in guano. Toxicological work has also increased, a wide variety of poisons having been investigated.

Delays in sending out reports have been numerous this year for a variety of reasons but farmers have shown great understanding of our difficulties and the customary good relations have been not only maintained but considerably strengthened.

Soils for Advisory Work

Tobacco has again been the dominant crop on which advice has been sought, and many farmers have once more asked for recommendations to be given in "straights". A wide variety of other crops has also been dealt with but the method of examining in the laboratory samples from pit profiles for small-scale irrigation schemes has now been abandoned.

Manures and Fertilizers

The rising interest in guano as a fertilizer has necessitated a large increase in the number of samples of this material submitted. Dealers are well aware of the variability in composition of guano and have been making every effort to have each consignment checked in order to comply with the Act.

Farm Feeds

Apart from samples taken for checking under the Act, most of the samples dealt with in this section were from manufacturers wishing to register their products or desiring check analyses of their various mixtures. It would appear from this that the Act is achieving its purpose of safeguarding the farmers.

Waters

The majority of the water samples came from the Ngesi Dam in connection with silt measurements. The arrangement whereby fewer samples were to be submitted during the winter months came into force but more samples were taken during the rains increasing the number analysed by almost 100.

Vegetable Products

Included in this group were a considerable number of tobacco leaves which were classified by the Government Grader and analysed for nitrogen and potash in order to find out whether there was any correlation between these constituents and their respective grades. This work continues. Other samples submitted have added some valuable information to our records.

Limes and Limestones

Only two samples were submitted this year by farmers from natural desposits, the others being all from commercial firms for the purpose of registration.

Toxicology

Four hundred and thirty-four post mortem specimens were analysed this year of which 210 proved positive and 224 negative. Again a wide range of poisons was suspected and a much more detailed analysis required in many cases. Blood and blood sera specimens have also been examined for abnormalities in their mineral content. " Veld poisoning " continues to present difficulties and much work requires to be done on this aspect of toxicology. Dipping fluids are included in this class and of these 16 were arsenical and 19 organics of various kinds. The high fee for organic analysis may deter farmers from themselves submitting samples and the fact that such analysis can not be done in the field indicates that few checks have been carried out during the year.

Miscellaneous

The very varied selection of samples grouped under this head includes a considerable number of pig fats done in conjunction with experiment work being carried out by the Pig Industry Board, a number of oils, tobacco leaves for oil content, pigs, grease and ox gall. D.D.T. Powder and Gwaai spray were tested and timber for its suitability for making wine casks. Various other minor tests were carried out for other departments, for farmers and for private firms.

Meats

Routine samples of meats were analysed for Henderson Research Station in connection with nutrition experiments.

Soil Survey

The report on the soils of the east bank of the Sabi River together with map was completed and a survey carried out on the west bank. Regarding the latter, conditions were found to be somewhat different from those on the east bank and the new soil problems encountered materially delayed progress. Much, however, was achieved despite transport difficulties. In addition a considerable area was examined, described and mapped of the land commanded by a proposed high level canal on the left bank of the Hunyani Poort Scheme.

According to a new arrangement entered into with the Director of Conservation and Extension, a soil chemist now makes an examination of proposed small-scale irrigation schemes in situ. This is likely to throw a considerable amount of extra work on this section of the Branch.

Research and Investigatory Work

Work on the assessment of nitrogen, phosphate and potash status of soils has continued. With regard to phosphate, it has been confirmed that an alkali extract gives the best correlation with crop response whilst fractionation studies with soils to which phosphates have been applied indicate that residual benefits from phosphatic fertilizer under certain conditions can be expected to be higher on most soils of medium to slightly acid reaction. The fears of many farmers, that in our soils phosphates are rapidly fixed in unavailable forms, are therefore groundless in the majority of cases.

Further studies on the methods of evaluating potassium status indicates that the method at present in use in advisory work cannot so far be improved upon but considerable advances have been made in methods of determining available nitrogen. By the use of an incubation method, figures have been arrived at for nitrate nitrogen released and these correlate closely with crop yields and with the amount of nitrate nitrogen released in a season in the field as determined by lysimeter experiments. So far the work has been done under climatic conditions pertaining at Salisbury. It is hoped that, when all the available data has been fully examined, it will be possible to introduce the method as a routine measure although it has the disadvantage of requiring a three-week period for completion.

Work has also proceeded on the evaluation of efficiency of uptake of fertilizer nitrogen by various crops. Considerable progress has been made but much remains to be done as seasonal variations are large and much more data will have to be collected over many seasons before the economics of nitrogen fertilization can be reliably predicted.

Experiments have been carried out on the nutrient uptake of maize the results for which are not only of considerable interest but should also supply some much needed fundamental information on which fertilizer recommendations can be based. Work also proceeded on the nitrogen content of rainwater; this will be continued during the coming season.

Pasture Research

The bulk of the samples examined came from Grasslands (740) whilst the remainder were from Henderson (190) and Gwebi (61). The use of green weights at Henderson as a measure of performance instead of total protein produced has resulted in a greatly reduced number of samples from that Station. The suggestion that protein determinations be carried out on the Stations themselves has so far not been put into effect but it is obvious from the above figures that Grasslands is the station which would benefit most from such a procedure.

Interesting work was done for Matopos on the full analysis of samples of grass and browse collected in the Lowveld to supply hitherto unknown information on the seasonal variations in chemical composition and feeding value of browse species in that area. Crude protein figures of 12–16 per cent. on a dry matter basis were common throughout the rainy season; the browse was also rich in lime.

ENTOMOLOGY

The most serious outbreaks or threats of insect pests included a widespread outbreak of army worm, local outbreaks of tobacco aphis, and threatened emigration of red locusts from their outbreak areas in the Rukwa Valley, Tanganyika.

Insect Records

The International Red Locust Control Service has had to battle with red locust adults in the Rukwa area, Tanganyika, where there is a tendency to swarm formation and emigration. One escaped swarm has been annihilated and further suspects are being sought out for destruction.

An outbreak of army worm, comparable with that of early 1930 which was the largest on record in Southern Rhodesia, occurred in January. Co-operation among the official and semi-official bodies concerned, the existence of modern insecticides, the facilities made available for speedy importation of insecticides, the improved communications with the resultant widespread early warnings to farmers, improved farming methods, and the prompt and energetic attack on the caterpillars by the farmers, resulted in a minimum of army worm damage to cereal crops, considering the destructive potentialities of the outbreak. Some individual losses, however, were severe. As this was the first major occurrence of army worm since a variety of modern insecticides had become available, chemical destruction had to be studied during the outbreak for immediate adoption. Despite the urgent claims by essential advisory work, these and biological studies were prosecuted.

Among other pests of cereals and grasses the maize stalk borer was foremost. Other cereal pests of note were the maize rootworm, *Sesamia* caterpillars, the *Tanymecus* snout-beetle which rags out the leaves of young maize and other plants, and the wheat aphis which seriously threatened a winter crop of barley. With the emphasis on army worm, some of these pests were erroneously reported as being of that species.

Dusty Surface Beetles were more than usually plentiful in some tobacco farming areas early in the rainy season and caused considerable damage by cutting off the young tobacco plants at ground level. Later, tobacco aphis was very prevalent and led to widespread outbreaks of tobacco rosette of which it is the vector. As usual the Root-Knot Eelworm was the most widely reported tobacco pest. Although Mr. G. Martin, the Helminthologist employed by the Rhodesia Tobacco Association, has recognized several species of *Meloidogyne* in Southern Rhodesia, only the commonest species, *M. javanica*, has so far been found by him to attack tobacco.

There were several reports of the bean leaf beetle causing severe damage to cowpea crops. Apart from the usual attacks of the Clouded Yellow caterpillar on lucerne, leguminous crops were singularly free from the attacks of insect pests.

A species of cetoniid beetle was found in association with holes in cotton bolls but, though it did feed on the bolls, it may not have been the initial cause of the holes. The usual cotton pests were less often reported to the Entomological Branch than normally.

Several kinds of scale insect were reported attacking a wide variety of fruit and ornamental trees. Successful trials of one of the newer insecticides, dieldrin, were made. It can be used as a tree banding material to prevent ants from attending the aphids or scale insects. This it does so effectively that infestations of soft brown scale or black aphis, are quickly reduced. It would doubtless succeed equally against other honeydew secreting scale insects and aphids.

The kaffir boom borer, which causes widespread damage to kaffir boom grown for ornament in the Salisbury District was bred to maturity and its identity established. A combination of pruning and the application of a mixture of DDT and parathion was found to give satisfactory control. A *bostrychid* beetle was several times found in the stems of the flamboyant tree. Its attacks may be associated with previous injury to the tree. The green bush locust caused extensive damage to fruit and ornamental trees in the Selukwe area. Its nymphs had previously been noticed as being more than usually plentiful elsewhere in Southern Rhodesia. An investigation into its habits and control has commenced. Preliminary results show that aldrin and dieldrin kill the adults and promise to be useful in control.

The powder post beetle was more in evidence than usual, especially in parquet floors. In one instance its activities there led to a court case in which the Branch was called upon to give professional evidence with the result that the complainant was awarded damages.

A stored product insect of cosmopolitan distribution, the drug store beetle, was found, apparently for the first time in Southern Rhodesia, infesting old dog biscuits.

Investigations

The army worm outbreak afforded a valuable opportunity of studying this insect. Control was found to be readily effected by using the various synthetic insecticides which have been developed in recent years. The main problem is to apply the insecticides quickly enough. Aircraft are obviously the ideal means of doing this but up to now the expense involved has been prohibitive.

Active and passive phase larvae were found to differ biometrically. While some broods of army worm moths might migrate before laying eggs, other broods were found to consist very largely of females which could lay eggs on the night of their emergence. This kind of behaviour, previously unsuspected, may be connected with the periodic outbreaks of army worm.

An investigation into the bionomics of the maize stalk borer is being carried out. It has been found that this insect can complete its development in Napier Fodder and that there are two colour forms of the moth. Another moth species has been found to have similar habits to those of the maize stalk borer, and its caterpillars are probably often confused with the latter.

Trials were made of the efficacy of applications of DDT in controlling red bollworm in cotton. These were part of a country-wide series of trials arranged by the Cotton Research Station. They were successful. The addition of BHC was found effective in controlling cotton aphis. Yields were significantly increased. An increase in mite population is receiving further attention though it seems of slight importance.

Trials were made in using Methyl Bromide fumigation and treatment with DDT and BHC to protect stored maize from the attacks of maize weevil and other pests. The results were inconclusive. The reasons for this are being studied.

Trials with a commercial systematic insecticide were carried out against aphids on tulip, a lily and on a young lemon tree about 2 feet high. The results were disappointing. In all cases the aphids were killed but only after a lapse of about ten days. This was too long an interval to save the tulip flower. In the case of the lemon, reinfestation occurred after the lapse of a further three weeks.

Taxonomy

Over 200 insect species were identified for the Branch by various specialists, mostly at the Commonwealth Institute of Entomology. The majority of these insects were new to our collections and 11 were species new to science. Of particular interest was the identification of 17 different species of army worm parasites, 12 of which had not previously been recorded as army worm parasites in Southern Rhodesia.

Advisory Service

The number of recorded enquiries regarding insect and other pests increased by 17 per cent. to 623, or, including recorded army worm enquiries, by 163 per cent. to 1,400. Many enquiries, especially among those relating to army worm, were unrecorded. Exhibits were placed on the Agricultural shows at Salisbury and Bulawayo, with professional officers of the Branch in attendance.

In addition to the visits made on tobacco pest inspection and nursery duties, numbering 1,505 and 30 respectively, and to miscellaneous visits on investigations, 38 visits to farms and other premises were made.

Twelve lectures and one broadcast talk were delivered on entomological subjects, eight of the lectures being to students of the Gwebi Agricultural College.

Plant Regulatory Service

New plant import regulations introduced or modified restrictions on the importation of pea seed, strawberry plants, grape vines and banana suckers, and recommendations further restricting the importation of sunflower have been made.

The number of packages of plants, fruit, etc., subject to examination on entering the country was 925,231, in 36,871 consignments, an increase of nearly 18 per cent. over the number of packages during the previous 12 months, which itself represented an increase of 17 per cent. Over 450 consignments of fruit, seeds, and plants were destroyed or returned to the country of origin, and a further 40 sorted before release, for the protection of our agriculture. Some of the items were returned for reasons not of a phytosanitary nature.

Special permits for the importation of individual consignments of plants totalled 957, representing a 5 per cent. decrease. Annual permits issued to approved nurserymen in the Union of South Africa to introduce their stock into Southern Rhodesia totalled 87, a decrease of nearly 15 per cent.

Forty-one nurseries were registered in Southern Rhodesia during the nursery year. In 30 inspections, red scale were found in small numbers in eight nurseries, and appropriate action was taken. Two nurseries were released from quarantine imposed during the previous year.

The number of tobacco removal licences issued for 1954 was 3,300 being 6 per cent. higher than the number for 1953. The number of inspections were 1,505, reflecting a decrease of nearly 12 per cent., accountable by illness, and the lapse of time following resignations and preceding replacements of inspectors. The small number of inspections compared with the premises licensed is believed to be partly responsible for a progressive increase in laxity in regard to the destruction of crop remains in the field and also in regard to the effective disposal of cured tobacco waste in tobacco buildings on farms and in manipulating warehouses. The improvement noted last year in the timely destruction of seed-bed plants was maintained.

Seven prosecutions were made for failure to destroy tobacco plants by the fixed dates and two for failure to destroy unwanted seed-bed plants. The nine prosecutions were all successful. The fixed dates for completing the destruction of tobacco plants were advanced by two weeks for Turkish type tobacco and by a month for other types, including Virginia. The dates are now 15th August and 1st July respectively.

The stored tobacco beetle was found on seven occasions in central manipulating and storage warehouses and twice in sample rooms.

Two visits were made to Beira by Entomologists of the Branch, by arrangement and through the courtesy of the appropriate Portuguese authorities there. Although on each occasion some parcels of displaced Rhodesian export tobacco in transit were found to be infested by the stored tobacco bettle, there was no evidence that infestation had occurred in Beira. On request the local authorities took appropriate action in regard to the infested tobacco, removing the threat to other tobacco awaiting shipment from there. The sheds are being kept clean and were satisfactorily sprayed with DDT.

Two certificates of partial exemption from the regulations in regard to the destruction of cotton plants were issued.

Certificates of freedom of plant material from pests and diseases, mainly for export, numbered 134 as against 69 in the previous 12 months.

Only small amounts of beeswax were imported from overseas, the major portion of our requirements coming from neighbouring countries. Two parcels of honey, prohibited from overseas, were destroyed on importation, and one large consignment was returned to the country of origin. Offer for sale of United Kingdom honey was observed in Salisbury in September, and the Federal Department of Customs and Excise was asked to deal with the matter in terms of the regulations.

Miscellaneous

A revival of interest in beekeeping is evident: A virile local association has been formed in Umtali, and resuscitation of the Rhodesian Beekeepers' Association in Salisbury is being planned. There is, however, no specialized Apiculturist in the Branch. *Nosema* disease has been identified by entomologists in Salisbury but not yet confirmed. Its presence would not be surprising, as the disease is known to have been present in the Union of South Africa for some years.

Staff

There is a notable disproportion in the composition of the staff. Whilst research and advisory work should not be outweighed by specialist services, there are only two entomologists, excluding the head of the branch, in an establishment of 16 Europeans.

Considerable difficulty was experienced in recruiting suitably qualified professional staff to replace losses. Three junior professional officers resigned. Difficulty was also experienced in recruiting field officers for service as Tsetse Fly Rangers.

Settlement of Africans with stock removed from the European area into the newly assigned Special Native Areas A, C, D and F in the Sebungwe District continued. It has been found difficult to control the movement of native stock based on the Kana River in the Special Native Area " C ". These cattle have been found grazing on the Mzola River in the vicinity of the Cewali and Dandanda pans, an area known to be lightly infested with tsetse. To prevent this movement a 70-mile long cattle fence will be erected along the Gusi Ridge between the two rivers from the boundary of the Special Native Area A to the Wankie District boundary and extended in a north-westerly direction to the vicinity of the Kalenda Mine. Settlement in the Special Native Area D is being restricted to an area lying south of the Mzongwe River. Settlement without stock is taking place along a line of boreholes between the Rutope and Sengwa Rivers in order to form a barrier between known tsetse and the new settlements along the Rutope and Kana Rivers. A small outbreak of animal trypanosomiasis occurred in the Special Native Area " A " but cleared up after treatment.

In the Urungwe District the general improvement in the trypanosomiasis position on the Karoi Block, which began to show up last year, continued. The incidence of the disease is now so low as to be negligible and has resulted in a considerable increase in confidence amoung the European farming community.

The position inside the Urungwe Native Reserve has also improved, only occasional tsetse being found in the eastern half of the Reserve. The western half of the Reserve is still subject to invasion and very high densities of tsetse are still found in certain localities west of the reserve.

A large scale field experiment in the use of aircraft for the application of insecticide in aerosol form was started at the end of November, 1953, using three aircraft. This work was discontinued at the end of March as it was found that the penetration of the aerosol into the heavy canopy of the woodland in the high tsetse concentration areas between the Msukwe and Badze Rivers was, except under ideal conditions, very poor. Also the general dispersal of the fly after the woodland had flushed into leaf necessitated the treatment of 100 per cent. of the area, a task beyond the capacity of three planes. Rain, low cloud, atmospheric turbulence and rising air currents made effective treatment impossible. The distance of the Karoi aerodrome from the scene of operations caused much loss in effective flying time.

A second series of applications using five planes was commenced at the beginning of July after a new airstrip had been constructed in the Urungwe Native Reserve. It was hoped that the meteorological conditions during the dry season would be more favourable than during the rains and that the area to be treated could be restricted to the dry season concentration areas. It was also hoped that by using an advanced airstrip two, and possibly, three, sorties per day would be possible. The same area was chosen for the experiment but was extended so as to include a number of river systems north of the Msukwe. During the first 28 day cycle the planes failed to cover the selected area and during each following cycle the area to be treated had to be reduced still further. It was also found that high winds during September and October and high temperatures causing turbulence and rising convection currents prevented a satisfactory deposition of the aerosol. Conditions deteriorated so rapidly that only one sortie per day and often none was possible. " Fly round " figures showed that where the applications were successful satisfactory kills were obtained. At the time of writing this Report the area to be treated has been reduced to the area covered by the earlier applications. In general, conditions during the late dry season proved more difficult than during the rains.

In the Mtoko District there has been a further deterioration in the general position. Tsetse has now been located, in very small numbers, on the Nyaderi River and heavy losses of stock have occurred in the Fungwe Native Reserve in the Mrewa District. Losses have also occurred in the Inyanga North Reserve. In order to control the movement of native stock a decision has been made to fence the Mtoko Reserve Boundary and to extend the fence across the Fungwe Reserve to the Mazoe River. A six foot high game fence is to be erected between the Mazoe and Ruenya Rivers running roughly parallel to the border fence. A cattle-free buffer zone is to be created in the Inyanga North Reserve. The efficiency of the native hunters in this area has improved considerably.

The border clearing in the Chipinga District was maintained in good condition by fire and slashing back of regrowth. Twenty-three cases of animal trypanosomiasis occurred involving four farms.

A special tsetse survey was carried out on the west bank of the Sabi River in the Ndanga District. This survey failed to reveal any tsetse but a local farmer later caught one *G. pallidipes* in the vicinity of Chitsa's kraal, close to the junction of the Sabi and Lundi Rivers. Very high densities of both *G. morsitans* and *G. pallidipes*

were found in Portuguese East Africa, close to the border, and odd specimens were taken on the east bank of the Sabi below the Chiberera Falls. Cases of animal trypanosomiasis continued to occur at the Mwangazi and Muumbi dip tank areas.

The position in all other areas remained satisfactory, no tsetse being found in the Hartley or Darwin Districts. The Doma settlement area has remained free from fly and trypanosomiasis.

Owing to the necessity to keep three professional officers on the aircraft spraying operations it was not possible to carry out the projected *pallidipes* surveys of the Zambesi Valley though a number of new localities for this tsetse were located.

BOTANY AND PLANT PATHOLOGY

The Branch reached full authorized establishment with the appointment of a Plant Pathologist in November, 1953, it was then possible to reorganize the activities of this section and to intensify research into important crop diseases. As a matter of general policy all sections of the Branch have expanded their contacts with other departments and several new collaborative projects were initiated during the year under review. These include seed studies in connection with the newly formed Pasture Seeds Association, maize disease investigations in co-operation with the Salisbury and Sabi Experiment Stations, cotton diseases with the Cotton Research Station, and potato diseases and seed potato production with the Chief Agriculturist.

Movements

A measure of the increased activity may be gauged from the fact that 22 districts were visited in the course of the year. Special attention was given to the Eastern Districts where officers made several extended tours of inspection. Frequent visits were paid to Government Experiment Stations and to the Triangle Sugar Estate and the Ewanrigg Aloe and Cycad Garden.

The Chief Botanist and Plant Pathologist visited Kenya and Tanganyika and also the United Kingdom where he represented Southern Rhodesia at the Fifth Commonwealth Mycological Conference and attended an International Seed Testing Course held in Cambridge.

Publications

Seven papers were published and three are in the Press. Articles and notes were contributed to the local farming journal and year book. A highlight was the publication of "*A Southern Rhodesian Botanical Dictionary of Native and English Plant Names*" by the Government Printer in February, 1954.

Botany

Herbarium

Accessions totalled 4,229 of which 1,474 were for other Government Departments. Several new records were obtained. Dr. Bremekamp described a new *Kohautia* and a new *Pavetta* from Southern Rhodesia in the Kew Bulletin.

Considerable material was sent abroad for critical study by specialists in eight different countries.

It is gratifying to report the completion of the "*Revised List of the Grasses of S. Rhodesia*". Seven parts have actually been published and the remaining three are ready for the Press. The "*Botanical Dictionary of Native and English Plant Names*" was well received and has been widely distributed throughout both European and Native Agricultural Departments.

Some progress has been made towards the Flora of South Central Africa (*Flora Zambesiaca*) project in that the appointment of an additional systematic botanist has been authorized.

Economic Botany

Poisonous Plants: Five cases of suspected plant poisoning in animals and humans were investigated on behalf of the Veterinary Department and Government Analyst.

Weeds: Numerous enquiries concerning garden and farm weeds were dealt with An illustrated handbook of common local weeds is in course of preparation. A descriptive article on parasite flowering plants (witchweeds) is ready for publication. Attempts to control water hyacinth in Lake MacIlwaine have been stepped up is co-operation with the National Parks Board. Two boats fitted with power sprayers for applying hormone weed-killers are now in use supplemented by hand sprayers operated from the banks.

Forage Plants: Exotic and indigenous legumes under trial as pasture and forage legumes were studied and named.

Collecting Expeditions:

Extended collecting expeditions were made to parts of Southern Rhodesia hitherto little studied botanically.

National Botanic Gardens

Work was again restricted to care and maintenance. Frequent visits were made in order to minimize damage to the vegetation occasioned by the extensive developments in progress at the Waterworks reserve and the laying of new pipelines through the gardens.

Plant Pathology

Laboratory

The 741 specimens received included 17 new diseases and 16 new host records of diseases. The following new diseases are of considerable importance:—

1. Scab of French Bean due to *Elsinoe phaseoli* Jenkins.

2. Leaf and Fruit Spot of Granadilla due to *Septoria passiflorae* Louw.

3. Anthracnose of tobacco caused by *Colletotrichum tabacum* Boning.

Crops

Tobacco: A widespread outbreak of rosette virus was the outstanding disease feature of the 1953/54 season. Symptoms were atypical and generally milder than in earlier epidemics. Two further cases of Granville wilt (*Pseudomonas solanacearum*,) the first new records for eight years, were reported from Headlands and Rusape. Wildfire was fairly common during the early part of the season but no extensive damage was reported. The first record of tobacco anthracnose in Southern Rhodesia was obtained from Nyabira. The disease has caused serious losses of tobacco seedlings in Northern Rhodesia in recent years and its appearance here is a matter of concern to the industry. Frog-eye and barn spot, both due to *Cercospora nicotianae*, were more prevalent than usual.

Potatoes

Late blight (*Phytophthora infestans*) was again general throughout the summer crop. It appeared two or three weeks later than in the previous season and losses though serious, were not devastating.

Blackleg (*Bacterium phytophthorum*) caused appreciable damage to early irrigation crops grown from imported seed. The available evidence points to the disease being introduced by the seed tubers and the matter is being investigated further.

Several tours of inspection were made of farms in the Eastern Districts interested in the production of seed potatoes. Methods of rougueing for virus diseases and off-type plants were demonstrated and special attention paid to the incidence of bacterial wilt (*Pseudomonas solanacearum*).

Maize

Only two reports were received of the new rust due to *Puccinia polysora*, despite a careful watch for its development throughout the country. The disease appeared even later than in 1953 and caused little or no damage to the crop. Experience during the last two seasons, coupled with information from adjoining territories, suggests that this new rust is unlikely to be of serious consequence in the principal maize-growing districts of Northern and Southern Rhodesia. Depending upon seasonal conditions it may assume local importance in parts of Nyasaland and the low veld.

Helminthosporium leaf blight was again widespread although, apart from the Hartley and Gatooma areas where heavy losses were reported, it was not so generally severe as in the previous season.

Sunnhemp

Numerous reports were received of stem-break disease caused by the fungus *Colletotrichum curvatum*. The disease appeared for the first time in low veld areas of the Eastern Districts.

Research

During the period under review the research activities of the Section were largely directed towards diseases of maize and sunnhemp.

Maize

More than 900 strains and varieties of maize were tested against the new rust disease and some 240 against Helminthosporium leaf blight. In view of the increasing importance of the latter disease in Southern Rhodesia special attention was given to the selection of resistant lines and the study of alternate hosts.

Sunnhemp

Progress was made in investigations regarding stem-break or lodging due to *Colletotrichum curvatum*. Pod and other debris, commonly occurring with commercial seed, has been found to carry the disease. Better seed cleaning and the use of a fungicidal dressing are therefore advised. In a detailed survey of diseases affecting this important green manure crop two sap transmissable virus diseases not previously recorded in Southern Rhodesia were encountered.

Velvet Bean

The organism responsible for a stem and vine rot of velvet bean in the Mazoe Valley has been provisionally identified as *Phytophthora dreschleri*. A search is being made for resistant varieties.

Potatoes

Three copper fungicides and one organic compound were tested against late blight. Bordeaux mixture and Burgundy Mixture were superior to copper oxychloride and "Captan" in controlling the disease on the foliage but caused considerable leaf scorch. Four late blight resistant varieties were promising in small scale trials. In more extensive field trials, the variety "Pentland Ace" was outstandingly sucessful although it was attacked in two cases by Black's race "34" of *Phytophthora infestans*.

Seed Testing

The Section was transferred in January, 1954, to better and more commodious premises previously used as the Biochemistry Laboratory of the Tobacco Pest Control Research Scheme.

Laboratory

Six hundred and sixty-nine samples were received and 1,628 tests were made. Nine per cent. of all samples and 30 per cent. of the tobacco samples tested failed to reach minimum standards.

Vegetables provided the largest number of samples closely followed by legumes. Much of the tobacco seed tested was carried over from the previous year and was inferior in quality to the 1954 crop.

Seed maize showed less disease than the previous year whilst maintaining a high germination capacity.

An unusually high percentage of hard seed was found in many sunnhemp samples particularly those from Native areas. It is thought that seasonal conditions were responsible.

Legislation

After a probationary period of a year, to allow the seed trade to become fully acquainted with the new Seed Regulations, more positive steps were taken to enforce the Regulations from April, 1954. A Seed Inspector conducted thorough inspections in Salisbury and Bulawayo. Elsewhere, the British South Africa Police performed similar duties. Numerous contraventions were observed and appropriate warnings issued; no prosecutions were made.

Frequent checks were made of the three approved seed testing laboratories now operating in Salisbury.

These activities, in connection with the administration of the Regulations, have naturally taken up more of the time of the Seed Analyst and his Staff than in previous years.

Research

Close co-operation was maintained with the Plant Pathology section regarding diseases of sunnhemp and maize. Methods for overcoming the presence of hard seed in sunnhemp and other legumes were worked out. Hard seed in *Crotalaria intermedia* can be detected by seed colour.

Investigations on the susceptibility of new inbred and hybrid maize lines to the main cob-rotting diseases were continued using modified techniques. These are more time consuming but provide a better index of susceptibility. Studies of *Fusaria* attacking maize grain indicated that at least one strain of *F. moniliforme* is sufficiently pathogenic to be of practical importance.

Methods were devised for the laboratory germination of *Bambatsi Panicum* and *Cenchrus ciliaris* grass seeds.

The Seed Analyst was actively concerned in the formation of the Rhodesia Pasture Seed Growers' Association and was largely responsible for preparing the certification scheme and an advisory pamphlet on grass seed production.

Seed Herbarium

This now includes more than 1,800 specimens. Samples were distributed to research organizations in Algeria, West Africa and U.S.A.

Miscellaneous

The Chief Botanist and Plant Pathologist acted as co-ordinator for the dissemination of information regarding the new rust disease of maize throughout South Centra Africa and with other research centres in Africa working on this problem.

In addition to representing the Branch on various Departmental committes he continued as Southern Rhodesia Scientific Liaison Officer for the Commonwealth Agricultural Bureaux and was also a member of the Federal Scientific Consultative Committee.

A series of lectures was delivered to students at Gwebi Agricultural College. Several Farmers' Associations were addressed.

CONCLUSION

The foregoing Report, prepared by the Heads of Stations and Branches, gives an outline of the work in progress and fuller information on any particular item may be obtained on application to the senior officers concerned. It is pleasing to report the great interest shown in the work of the Department by farmers and others and this interest is a real stimulus to the efforts of all officers. I am happy to acknowledge the valuable co-operation and assistance received from other departments in the Ministry and many outside it. Finally, I wish to pay a well merited tribute to the enthusiasm and hard work of all members of the Department.

CONSERVATION AND EXTENSION SERVICES

J. J. Duvenage: Acting Director of Conservation and Extension.

1. THE AGRICULTURAL INDUSTRY

There has been steady progress in the agricultural development of the Colony over the last year. The important place of the agricultural industry is, no doubt, appreciated by all those concerned with the land and its resources, but there is still an urgent need for a change in outlook towards the land amongst a large section of the population, especially those in other spheres of production or development.

There has been a surplus in the production of certain food commodities but on the whole the food supplies of the Colony must be substantially increased if greater stability is to be achieved in the future. This is not only important for the sake of the agricultural industry but in fact is essential for all commercial and industrial development as food is the most important cog in the wheel of progress.

The following table, taken from the monthly Digest of Statistics Vol. 1, No. 7, October, 1954, gives the gross value of agricultural output for the years 1938 to 1953.

Item	1938 £ (1,000)	1939 £ (1,000)	1944 £ (1,000)	1949 £ (1,000)	1950 £ (1,000)	1951 £ (1,000)	1952 £ (1,000)	1953 £ (1,000)
Pastoral and Dairying:								
Dairy produce	199	222	391	670	749	923	1,082	1,190
Cattle slaughterings	832	795	1,249	1,884	2,531	3,179	4,013	4,442
Sheep slaughterings	23	29	63	92	106	113	128	120
Goat slaughterings	3	3	12	14	18	24	27	23
Pig slaughterings	66	72	197	345	312	530	738	982
Eggs sold	64	75	110	240	214	249	258	281
Other	303	284	428	555	560	852	784	1,172
Total ..	1,490	1,480	2,450	3,800	4,490	5,870	7,030	8,210
Crops and Orchards:								
Maize (grain)	621	576	1,247	2,023	3,159	2,189	5,554	4,871
Tobacco	1,132	951	2,990	10,944	16,471	12,940	17,286	17,395
Potatoes	55	44	177	186	261	266	393	233
Wheat	40	59	79	12	9	8	18	26
Groundnuts	18	14	44	23	54	54	73	76
Cotton	2	1	2	52	85	111	367	80
Citrus	53	58	102	91	169	229	231	236
Other crops, etc.	359	377	949	1,919	2,412	2,693	3,058	3,093
	2,280	2,080	5,590	15,250	22,620	18,490	26,980	26,010
Total Gross Value ..	3,770	3,560	8,040	19,050	27,110	24,360	34,010	34,220

This table indicates that the gross value of the agricultural output increased by 808 per cent. while the analysis by the statistical office in respect of the gross volume produced shows an increase of only 178 per cent. Furthermore it will be observed that the increase during the last year was in respect of the pastoral and dairy products and that there was actually a decrease in the output from crops and orchards.

Price structure as well as total production are responsible for the annual increases but the fact remains that measures must be instituted to maintain an increase in agricultural production in order to keep pace with the growth in population.

VI. GENERAL AGRICULTURAL CONDITIONS

(*a*) Climatic Conditions and General

The past year can be described as above average in respect of the agricultural conditions for the major portion of the Colony. With the exception of parts of the Eastern Districts, where rainfall was below average, the conditions generally were most satisfactory for the production of crops as well as from a livestock maintenance and production point of view.

(i) *Mashonaland*

In Mashonaland crop growth was above average for the major portion of the year, although dry spells affected the yield in certain parts. Most farmers were, nevertheless, satisfied with the final results at the end of the season. The winter in this part of the Colony was not severe except for a very short but sharp cold spell towards the end of the season. Water supplies were well maintained and the flow in rivers and streams carried on throughout the dry season at a satisfactory level for irrigation purposes in most parts of the region. Livestock kept their condition very well throughout the season, due to the good grazing conditions, good water supplies and adequate feed available on most of the farms.

(ii) *Midlands*

The past season was satisfactory in the Midlands Region until the end of January when rains ceased over most of this Region. As a result there was a reduction in crop yields especially in the areas below the 25 inch rainfall line. In spite of this factor, conditions generally were satisfactory and record crops of maize and tobacco were harvested this year. Similarly, livestock came through the season in excellent condition and prime stock were marketed off the veld from these parts during the year. Water supplies were fairly well maintained, except in the lowveld region where most of the major dams did not fill, due to the fact that the rains were gentle and run-off low. The farmers and ranchers in these parts have had to arrange for the sinking of boreholes in order to ensure that water supplies would be available for cattle during the dry season.

(iii) *Matabeleland*

While the total rainfall in Matabeleland was not high, it was much better distributed than normal with the result that good conditions prevailed for crop production. The grazing conditions in Matabeleland were excellent throughout the year as a result of the favourable climatic conditions in most parts of the area. Water supplies were well maintained and no difficulty was experienced in maintaining the animals in good condition during the year. Lack of run-off did, however, seriously affect stored water supplies in certain parts. The winter was one of the coldest for many years with heavy frosts causing damage to vegetable and other crops.

(iv) *Eastern Region*

In this part of the Colony the year was a patchy one on the whole, with rainfall generally below average. Good planting rains were late and fell in periods of comparatively short duration, interspersed with rather too long, hot, dry periods which tended to the wilting and scorching of many crops. An early winter was experienced and it was one of the coldest on record. Frosts were widespread and in some areas severe damage was caused to vegatables and fruit crops. Water supplies lasted well but towards the end of the dry season fell rapidly and farmers were short of sufficient water for irrigation purposes. Crops were variable throughout the whole of the Region, although some record yields were obtained in both tobacco and maize, especially from early planted crops.

(*b*) Crop Production

(i) *Food Crops*

Maize: This year has been a record season for maize production throughout the Colony. This is mainly due to the favourable climatic conditions but at the same time it must be accepted that farmers are, on the whole, improving their methods of production especially in respect of soil management. In many instances, farmers are investigating the fertility of their soils, either through analysis or through field trials or both. Through this system the use of fertilizers and especially the correct uses of balanced fertilizers, has increased remarkably with good results as indicated by the final yields.

Farmers have become aware of the necessity of good stands if yields are to be improved on an economic basis. More attention is therefore being given to planting, to ensure an adequate stand and plant population in relation to the moisture conditions and the fertility of the soil. In several instances, yields of up to 40 bags per acre have been obtained in Mashonaland this year where stands were good and management

efficient. This is an indication of the tremendous potential of this Region once soil and crop management practices are brought to a high level.

In the Midlands Region the maize crop was generally above average, although yields were reduced considerably as a result of Helminthosporium. This disease seems to be spreading and farmers on the maize belt are most concerned about this problem.

In the Matabeleland area maize yields were certainly above average, due to the season being better than normal. Here again farmers might now be tempted to produce maize regularly which would be unwise under normal conditions.

Of interest this year were the excellent results obtained from maize grown on sandveld in Mashonaland and the Midlands with suitable fertilizer applications. These results indicate that the sandveld can be utilized for economic maize production if management practices are correct. The outbreak of army worm during the growing season throughout the Colony did affect the maize crop but only to a minor degree. Serious damage was avoided, due to the immediate action taken by the farmers and the Government to control this outbreak. Stalk-borer did some damage in certain parts of the Colony but here again farmers are accepting the position that treatment for stalk-borer should be normal farm practice.

In certain parts, farmers are concerned about the condition of their soils, and trials including stubble mulching will be carried out during the coming season. It may be that greater emphasis will be necessary on the incorporation of more organic matter into the soils to maintain it in good productive condition.

Sorghums: Very little sorghum was grown during this year mainly because of bird damage experienced during previous years. In certain parts of the Midlands and Matabeleland, good crops were, however, harvested where suitable varieties were grown and planting done as early in the season as possible.

Munga: While munga is not looked upon as a grain crop, in most parts of the Colony it is being grown more extensively for fodder purposes as well as for green manuring in rotation with tobacco and maize. There is no doubt, however, that this crop can be a most useful grain crop on sandveld in the lower rainfall areas.

Groundnuts: Groundnuts are mainly grown to supply the farm labour with their requirements and consequently only small acreages are planted on farms in the Colony. Here again the full potential of this crop in several parts of the Colony still awaits investigation and it may be that it could be developed into one of the cash crops of the Colony.

Wheat: There has been a reduction in the planting of summer wheat due to the failures experienced in the previous season. In the granite vlei areas, however, more wheat was grown this year than the previous season and some of the yields were quite satisfactory. With field trials being undertaken in these parts, it is hoped to establish suitable systems of soil and crop management for the production of wheat in vleis. There is no doubt that if yields could be improved that the farmers will produce wheat on an increasing scale in the future, provided the price structure is maintained or increased. On the irrigation schemes in the Colony the wheat crop was one of the finest on record and above average yields were obtained in most areas. To a lesser extent other winter cereals such as barley, oats and rye, are produced under irrigation in certain parts of the Colony.

Potatoes: Late blight again caused serious damage to the summer crop in Mashonaland and it is estimated that yields were reduced by about 30 to 40 per cent. Irrigated crops were also affected to a certain extent but these were generally satisfactory. The marketing of potatoes has not been to the satisfaction of the farmers during the past season and it seems that further investigations are necessary to bring about greater stability in this respect. In the Eastern Districts the production of seed potatoes is becoming more important and it may be that this will be one of the finest side lines to farming in this part of the country.

Vegetables: Considerable progress has been made with the production of vegetables throughout the Colony, but especially in the Eastern Districts where the Horticultural Officer was available to render assistance to the farmers and producers. In this area Federated Fruit Growers' Association has been formed with the purpose of further investigating and sorting out the potential of the area and to organize marketing of vegetables. One of the major problems at the present time is the question of organized marketing. Production has to be so arranged that it meets with the seasonal demands, and this is only possible when there is a system whereby growers can obtain information as to the demand and supply position throughout the year. It is therefore considered that the formation of the Association is a step in the right direction and will probably lead to the formation of similar associations in other parts of the Colony. A certain amount of damage was done to vegetable crops as a result of a severe cold spell during the latter period of the winter season. Some farmers also suffered losses in Matabeleland during an excessive wet spell in the

summer. On the whole, however, it was a good season and the quality of produce is improving from year to year. The opening up of a canning factory at Chipinga by Messrs. Sunrho Limited, will further stimulate the production of vegetables in that region, which will make a difference to the farming potential of the area and to the income of the smaller farmers in the Chipinga District.

Fruit: It can be stated with confidence that the deciduous fruit industry is progressing very satisfactorily. Results from irrigation, fertilizing and the application of trace element sprays, have been most encouraging to growers in the Eastern Districts. There is a growing interest in the Eastern Districts in the production of more fruit and the assistance of the Horticultural Officer is appreciated by the farmers. In addition to deciduous fruit production, tropical fruits such as bananas, pawpaws, pineapples, etc., are being planted on an increasing scale and with the guidance of the officers in the Eastern area, one can expect greater production in the future. Several varieties of these fruits are being planted on the demonstration farm as well as by the farmers and in due course it will be possible to evaluate the different varieties as to suitability for the area.

(ii) *Cash Crops*

Tobacco: The past season has proved to be a record one for tobacco production. With the exception of the Midlands, general rains did not fall until about the third week of November. Good weather conditions persisted for quite a while and by the middle of December, probably 80 per cent. of the crop was planted. The successful planting period certainly stimulated the production and is one of the factors responsible for the increase in yield per acre during this year. Severe hail damage was caused to crops during the past season and several growers lost heavily. Only 65 per cent. of the growers insured against hail and it is possible that the damage suffered by farmers is appreciably more than what is known to the trade.

One of the major handicaps for successful tobacco production is still the management of seed-beds and the production of good seedlings. It is not possible to produce a good crop without sound, healthy and strong seedlings. The Extension Officers are doing their utmost to assist farmers in this respect. Seasonal conditions, inadequate labour and barn accommodation, during January and February, saw a potentially high quality yielding crop being literally spoilt in the lands and in the barns. It is estimated that the actual hidden loss of tobacco during the past season is in the region of 20,000,000 lbs. of tobacco or one-sixth of the final figure for the crop. If the same acreage is planted during the coming season, then 10,000 more barns will be required to cope with the tobacco. It is heartening to note that most farmers are building two or three extra barns in order to avoid the losses suffered last season. Farm grading this season proved to be worse than the previous years and the Rhodesia Tobacco Association circulated all tobacco farmers to the effect that the " Boss boys " were not capable of grading tobacco unassisted by an experienced European in the shed at all times. It is essential for the sake of the industry that the high percentage of nondescript tobacco must be reduced as early as possible.

Field trials were undertaken with the co-operation of tobacco farmers and in consultation with Research Officers in various parts of the country. These trials proved to be most valuable and stimulated tremendous interest and will be continued during the coming season. It is gratifying to report that farmers are taking a greater interest in soil management for tobacco production and suitable rotations with grass as a crop are being established on many farms. This has also led to further interest in the animal factor on tobacco farms and will consquently bring about more diversified farming.

The number of registered growers during the past season was 2,845 of which 2,668 actually grew tobacco. This represents an appreciable increase over last year's figure. The total acreage planted was 172,500 acres as compared with 179,000 acres last year. A record crop of 120,251,036 lbs. of tobacco were sold for £19,212,635 at an average price of 38.35*d* per lb. The average yield of 697 lbs. per acre was also a record. The average size of crop planted was 64 acres per grower and the average income was £7,201 or an average return of £111 per acre. It is essential that the yields per acre should be stepped up considerably and every grower should aim at not less than 800 lbs. per acre, which is quite feasible as many growers already average 1,000 lbs. and more, per acre. The work of the Extension Officers during the past year proved most valuable and the demand for assistance is ever increasing especially amongst the new growers and inexperienced farmers settling in the Colony.

There was an increase in production of fire-cured tobacco but the average price per lb. was only 10.69*d* as against 16.7*d* last year. This is the lowest figure in nine years. The average yield was 610 lbs. per acre. From these figures it is difficult to understand why farmers persist in the growing of fire-cured tobacco in the face of such low returns. Turkish tobacco was grown mainly in the Darwendale area and the total estimated crop was 160,000 lbs. The crop was grown by approximately 80 growers, most of whom planted a small acreage in addition to the Virginia crop.

There has been some interest in the production of this crop in Matabeleland and it is quite likely that with further assistance and encouragement, an increase in the production of Turkish tobacco can be expected in this region.

Cotton: Very little cotton was grown by farmers during the last season, due to damage by insects during the previous season and the low financial returns obtained. It is doubtful whether there will be more cotton grown by farmers in the future unless there is a marked improvement in the price structure. Some field trials were again undertaken in co-operation with the Cotton Research Board and these have proved to be most valuable to both the farmers and the Research workers.

Lucerne: There was an increase in the establishment of lucerne, wherever irrigation facilities were available. The crop is mainly produced as food to meet the farmer's own requirements although several producers are now selling lucerne meal on a protein basis. With further development of irrigation, this crop will become more important and the time may come when sufficient will be produced to meet the requirements of the Colony.

Tea: Due to the poor rainfall in the Chipinga area, this crop was greatly reduced. The estimated yield was 850,000 lbs. which is well below the million lb. level exceeded last year. The opening up of a tea estate in Inyanga is progressing well and should be in production within the next few years.

Coffee: Some interest has also been shown in the production of this crop as a result of good prices for the beans. About 20 acres were planted in the Melsetter area and arrangements were made for further plantings on two farms in the Chipinga area.

Castor Bean: As a result of the activities of a private firm, to promote the production of the castor bean in the Colony, there has been some interest in various parts. Field trials are being undertaken during the coming season, with seed supplied by the firm concerned. If this crop proves successful, it will no doubt, be of value to farmers to plant in rotation with maize, tobacco and other crops.

Rice: There has been a slight increase in the production of rice in certain areas, but thus far the yields obtained have not proved to be satisfactory. Several farmers are trying different varieties and improved systems of management which are of value to the country.

Grass Seed: During the year the Rhodesia Pasture Seed Association was formed with the aim of producing good quality clean seed both for home consumption and export. Several successful farmers have succeeded in bulking up seed but the demand still exceeds the production at the present time. This Department has undertaken to assist with field and crop inspections for the Association until such time as they are in a position to appoint their own inspector.

(iii) *Stock Feed*

It is gratifying to report that the growing of stock feed is definitely on the increase throughout the Colony. The production of silage has been stepped up on most farms and one individual produced in the region of 2,000 tons in Matabeleland, feeding over 1,000 head of cows and weaners, during the dry season. Most farmers still underestimate the requirements and invariably run short of feeds towards the end of the dry season. Napier Fodder has been established on an increasing scale, especially in the Eastern Districts and parts of Mashonaland. There is also a definite increase in the establishment of irrigated pastures and the production from these are being watched very keenly by many farmers. With further experience in managing and fertilizing such pastures, it might well prove to be a sound and economic proposition to many farmers, especially for dairy production.

Hay: Hay production is still short of requirements and it is essential that more emphasis should be placed on the production of good quality legume hay to feed in the dry season together with veld hay, especially in the Midlands and Matabeleland. Although there has been an increase in veld hay production, the quality is generally not of a high standard and if this could be mixed with good quality legume hay, it would make a vast difference in the maintenance of the animals.

(*c*) Livestock

The past year can be described as a most favourable year for livestock in general. Grazing conditions were good throughout the Colony with the exception of parts in the lowveld, where water supplies were not well maintained.

(i) *Cattle*

Beef Production: Although there has been an improvement in the general management of beef herds, one cannot yet report a satisfactory position. There is an improvement in many areas in respect of fixing breeding policies in relation to local

conditions and the Extension Officers have assisted farmers greatly in the culling of their herds and acquiring good bulls. Although many farmers still persist in running the bulls with their herds throughout the year, there is an improvement in the position as definite breeding systems are now organized by farmers and ranchers. On many farms, the owners are now feeding their breeding stock and weaners during the winter months and this has proved most profitable and will, no doubt, be followed by others.

It is essential to draw attention to the lack of regular dosing of cattle and this is still one of the major causes of losses throughout the Colony. Once farmers can be persuaded to dose regularly for internal parasites and to inoculate their animals against quarter evil, contagious abortion and other diseases, there should be a marked improvement in the production of the farms. Calving rates are still far too low and culling of breeding stock is not as regular as it should be. In spite of all the difficulties, it can be claimed that the beef industry as a whole, is improving and with a sound price structure, this position should be maintained.

Dairy Cattle: Generally speaking, most dairy farmers look after their herds exceedingly well. It is only in isolated cases where young stock are neglected but this position is improving as a result of the activities of the Extension Officers in many parts. The Dairy Bonus Scheme has been well received and will further stimulate the production of dairy products and assist in improving the management of dairy herds.

(ii) *Sheep*

There has been a steady increase in the numbers of sheep maintained by farmer in small flocks for home consumption. It is felt, however, that more sheep could be maintained on farms, especially if the management could be improved. German Merino rams have been introduced on a few farms and it appears that these are doing well and might be a useful type to use in the Colony, either as a pure breed or for crossbreeding purposes. With the increase in established pastures, there is little doubt that sheep could be brought into the farming systems on an increasing scale and should prove most profitable.

(iii) *Goats*

There has been little change in the position as reported last year and the Extension Officers are endeavouring to persuade farmers to maintain small numbers where these will fit into the farming system practised.

(iv) *Pigs*

Production has been considerably reduced by the tightening up of the grading system but this has resulted in improved management and more economic feeding. Several of the smaller producers went out of production when the new grading system came into operation but it is possible that there will be an increase in the future once the new system has been stabilized. Dr. Calder addressed several farmers' meetings in various parts of the Colony and as a result of his meetings and demonstrations, there has been greater enthusiasm amongst producers and certainly an improvement in management practices. It is felt that with the guidance that can be expected through the Pig Industry Board more effective production could be brought about in the future.

(v) *Poultry*

The sad and recurrent poultry story repeated itself this year when eggs dropped to as low as 1*s*–3*d* a dozen. Some of the poultry farmers have reduced their numbers while others have gone out of production altogether. Very little progress can be expected until such time as the industry becomes more stable.

(vi) *Fish*

General interest in fish is still evident throughout the Colony and individual farmers have been most successful in obtaining good production from dams stocked a few years ago. The general management of the dams stocked with fish requires improvement and one can only expect slow progress in this direction. In isolated cases, farmers are constructing special fish producing ponds and under this system they will, no doubt, achieve greater success.

(vii) *Livestock Improvement Scheme*

There has been an increase in the number of applications for grants under this scheme during the year. It is evident that farmers are showing a greater interest in the use of good bulls, as a result of the assistance by officers of the Department, the good season and satisfactory prices for cattle. The time will no doubt come for the Committee to consider raising the standard under which grants are payable.

Field Officers of the Department carried out 338 inspections under the scheme and in addition the Animal Husbandry Officer, who continued to serve as secretary to the committee, carried out 203 advisory and inspection visits to farmers.

The committee again controlled the importation of stock, both pedigree and grade from the Union of South Africa. The demand for grade females, confined to dairy stock, greatly exceeded the quota and the committee had to allocate in accordance with the urgency of requirements.

The committee assisted with the purchase of livestock on behalf of farmers who could not make their own arrangements, and this service is proving most valuable and further ensures that good quality stock is brought into the country. Many farmers naturally purchase their own animals in the Union or United Kingdom and import direct.

The following purchases were made by the Livestock Improvement Committee, during the year, for farmers who were not able to make their own buying arrangements.

		Total cost £ s d
37 Pedigree bulls	.. .. ..	6,811 10 0
— ,, females	.. .. ..	—
199 Grade females	.. .. ..	9,747 0 0
TOTAL .. 236		£16,558 10 0

Below are given particulars of stock imported into the Colony for breeding purposes.

Country from which imported	*Breed*	*Males*	*Females*	*Total*
Cattle:				
United Kingdom (Pedigree)	Ayrshire	— ..	14 ..	14
	Friesland	1 ..	— ..	1
	Jersey	8 ..	62 ..	70
	Aberdeen Angus ..	1 ..	— ..	1
	Hereford	3 ..	— ..	3
	TOTAL ..	13 ..	76 ..	89

Country from which imported	*Breed*	*Males*	*Females*	*Total*
Union of South Africa				
(Pedigree)	Ayrshire	6 ..	42 ..	48
	Friesland	17 ..	47 ..	64
	Guernsey	4 ..	6 ..	10
	Jersey	11 ..	32 ..	43
	Aberdeen Angus ..	1 ..	— ..	1
	Africander ..	234 ..	86+4 calves	320+4 calves
	Hereford	20 ..	— ..	20
	Shorthorn ..	1 ..	14 ..	15
	Sussex	14 ..	15 ..	29
	South Devon ..	6 ..	10 ..	16
	Red Poll	1 ..	— ..	1
	Brown Swiss ..	1 ..	— ..	1
	Drakensberger ..	6 ..	— ..	6
	TOTAL ..	322 ..	252+4 calves	574+4 calves
Union of South Africa .. (Grade)	Friesland	..	365+7 calves	365+7 calves
	Jersey	..	276+3 calves	276+3 calves
	TOTAL ..	..	641+10 calves	641+10 calves
* *Sheep*				
Union of South Africa ..	Ronderrub ..	2 ..	— ..	2
	Dorsium	2 ..	— ..	2
	Blackhead Persian ..	7 ..	110 ..	117
		11 ..	110 ..	121
Pigs:				
(United Kingdom) ..	Landrace	4 ..	13 ..	17

* Purchased by Livestock Improvement Committee. No account of private importations.

The Rhodesian Jersey Cattle Club made two importations during the year, consisting of 53 heifers and one bull. These animals came from the United Kingdom and Jersey Island. They were sold by public auction at satisfactory prices generally. The opinion of the Jersey Society Inspector was that the type of heifer imported was very good and should do a lot of good for the breed throughout the Colony.

Inspection tours in the Colony were made by the Inspectors of Breed Societies of Africander, Friesland, Guernsey and Jersey cattle. The Inspectors were accompanied by officers of this Department which was of mutual benefit.

VII. PRODUCTION FROM IRRIGATION

There was greater interest in irrigation farming during the year than was expected in view of the good season. The value of water in crop production is realized by many farmers, especially now that the irrigation of tobacco is proving so profitable. The acreage under irrigation has increased from 12,000 acres during the 1940's to 30,000 acres at the present time, and there is still an annual increase as further projects develop. It is unfortunately true that many farmers are not making full use of their water rights. This matter is now being investigated by the Water Court and many rights have been cancelled and others reduced in accordance with development.

The water supplies for irrigation were good during the year, except in parts of the Eastern Districts where the position became rather critical towards the end of the dry season.

Good results were obtained with all crops under irrigation and tobacco proved most profitable. Yields of 1,800–1,900 lbs. per acre were cured, selling at an average price of 50*d*–55*d* per lb. A substantial increase in the acreage of irrigated tobacco can be expected in the future.

There is still need for further information in respect of soil and crop management techniques under irrigation in order to achieve maximum yields under local conditions.

The Irrigation Officer of the Department was kept busy with visits to farmers for assistance in regard to irrigation lay-outs, attending field days on irrigation schemes, delivering talks to farmers on irrigation and assisting local officers with difficult problems. The services rendered by this officer have been highly valued and it is therefore pleasing to report that a second officer has recently been appointed to assist with this important work.

(*a*) Umshandige Irrigation Scheme

The general progress at Umshandige has been maintained this year. Further levelling and terracing was done for the settlers by a Government Unit. The nine settlers remaining on the scheme should now be able to make a reasonable living on these farms. This year the wheat is excellent and record yields are expected.

(*b*) Lower Umgusa Scheme

Good progress can be reported under this scheme. Most of the settlers are now appreciating the need and value of the dairy animal and whole milk production is on the increase. Several of the settlers, who were struggling, left the scheme and there is now generally greater stability.

Unfortunately, many were badly hit by the wet summer and their vegetables were more or less written off. During the winter heavy frosts again caused damage to crops, but having their whole milk behind them the settlers were able to weather the storm.

Good progress has been made by improving lay-outs and most farmers now use the syphon system. Overhead irrigation has been introduced by a few settlers and is proving satisfactory.

(*c*) Lower Mazoe Scheme

During the year one of the settlers gave up as he was not making satisfactory progress. The remaining five have done exceptionally well and there is every possibility of these Coloured families making a success of this venture.

The committee that was set up to assist and guide them deserve credit for the manner in which this scheme has developed. The settlers are now being given more responsibility in regard to the disposal of their produce and financial affairs generally,

Improvements have been made in the lay-out of the lands as well as with the development of more land within the finances of the settlers.

(*d*) Sabi

This Department has been made responsible for the establishment of the development farm in the Sabi Valley. A farm of 120 acres, adjoining the pilot Research Station, has been selected for this purpose. It is hoped to bring about the required development during the coming year in accordance with the proposed plan.

Once the buildings are constructed and the lands prepared for irrigation, the farm will be operated by a suitable farmer on his own account in terms of a planned agreement and programme.

VIII. SOIL CONSERVATION

(*a*) Farm Planning

The procedure to be followed in farm planning was finalized during the year and field officers will in future be able to render greater assistance in this respect. There has been pressure for this important service in all parts of the Colony and several farmers have been assisted with complete farm planning. Once the full value of this work is realized the officers will not be able to cope with the demand for assistance, this in fact is already the case in the Mazoe Valley and the Hartley-Gatooma area.

In the Mashonaland region work has been commenced on 43 properties already with varying degrees of progress. In the other regions work is also in progress on many farms but due to lack of information and awaiting the finalization of procedure the work had to proceed rather slowly and carefully. The main handicap to this work is the absence of suitable maps.

(*b*) Arable Areas

There are approximately 829,000 acres of land under cultivation in European areas.

Cash crop acreages are:—

Maize	363,000 acres
Tobacco	172,000 ,,
Sorghum	10,000 ,,
Root crops and pumpkins	6,000 ,,
Legumes, including groundnuts and legumes, for cash	181,000 ,,
Cultivated grasses	14,000 ,,
Total	746,000 acres
Balance in other crops	77,000 acres

Maize production averages approximately seven bags per acre and tobacco production averages 697 lbs./acre. It is probable that at these production levels the average soil loss per acre is of the order of 30 tons per acre per annum and applying this over the whole arable acreage gives the total probable soil loss off arable land at approximately 25 million tons per annum.

Many farmers and research stations have proved and demonstrated that these average yields could be doubled and it would be fair to assume that if the average yields were doubled the average loss by erosion would be reduced to 20 tons per acre. The acreage under cultivation for the same production would be halved, or the same acreage could produce twice the volume of crops. For the same volume of production the soil loss would be only 8 million tons—one-third of the present rate. This is a modest estimate of what can be done to reduce erosion. By an all-round application of better farming at higher levels of fertility, using more perennial cover crops, mulch tillage, early planting better stands and higher plant populations the average loss by erosion *could* be reduced to a figure of the order of one-tenth of what it is now. (At present volume of production.)

Now that the mechanical protection of arable lands is an accepted practice it is essential that we move forward from our defensive works and attack erosion at its base by better production methods at higher levels of fertility and this is now being done. Since 1929 a total of 51,000 miles of contour ridges have been built, and at 18 acres per mile this represents an arable acreage "protected" of 920,000 acres—a figure comparable to the total acreage cultivated. It would of course be idle to assume that all arable land is adequately protected by mechanical works. Many have been allowed to fall into disrepair, but the back of the job has been broken and the move forward cannot be delayed. The recent reorganization of the Department will do much to further this forward move and to promote the production of crops at a higher level of fertility with consequent reduction in erosion losses.

(i) *Erosion Control Research*

The Series I experiments at the Henderson Research Station have been through their first rainy season and have given some interesting results which are shown below.

Experiment 1

		Maize	*Sunhemp (green crop)*	*Napier fodder*	*Sunhemp (legume hay)*
6½% Slope	% Run-off	30%	40%	8%	40%
	Soil loss Tons/acre	4.0	23.4	1.4	40.1
4½% Slope	% Run-off	28%	27%	14%	25%
	Soil loss Tons/acre	2.5	7.5	1.7	6.9
3% Slope	% Run-off	19%	30%	2%	29%
	Soil loss Tons/acre	2.8	5.9	0.4	9.6

These results must be viewed in the light of the fact that the land had been reverted to natural pasture for a very long time and was practically virgin.

One very heavy storm in January (5.3 inches in under three hours) which reached an intensity of just under 8 inches per hour, produced on the 4½ per cent. slope 63 per cent. of the total erosion for this slope.

Experiment 2:

Effect of Length of Slope.

Normal Spacing contours 7 tons/acre soil loss.

1½ Normal Spacing = 15 tons/acre soil loss.

2 × Normal Spacing = 24 tons/acre soil loss.

This shows an increase in erosion proportional to the square of the length of slope and emphasizes the need to break length of slope by means of contour ridges. The slope was 4½ per cent.

The Series II experiments on Mazoe Red Soil is under construction and it is hoped will produce some results in the coming rains.

The scientific and propaganda value of these experiments is very great indeed and their value to conservation will undoubtedly exceed their cost many times over.

(ii) *Mechanical Protection Work*

It is heartening to note that the total of this work has reached a new record, despite the fact that extremely little land protection work was done by Government units. There is no doubt that this is a job which the farmer can do much more economically than the Government units can and farmers are appreciating this fact. The table below gives the figures for the past three years.

Circle	Period	Contour Ridges (Miles)	Storm Drains (Miles)	Bench Terraces (Miles)	Irrigation Furrows (Miles)	Pasture Furrows (Miles)	Grass Strips (Miles)	Veld Ripping (Miles)
Mashonaland	1951/52	1,977	120	8	4	18	—	—
	1952/53	2,791	116	13	16	8	—	—
	1953/54	3,249	113	15	51	2	—	—
Midlands	1951/52	1,095	120	58	20	29	110	—
	1952/53	1,097	73	90	23	29	—	—
	1953/54	765	88	2	35	1	17	—
Matabeleland	1951/52	118	39	7	9	—	—	30
	1952/53	234	31	3	36	3	—	940
	1953/54	192	30	6	42	1	—	—
Eastern	1951/52	1,094	70	33	3	6	—	—
	1952/53	1,066	90	15	24	8	—	—
	1953/54	1,244	90	10	27	—	29	—
TOTALS	1951/52	4,284	349	106	36	53	110	30
	1952/53	5,188	310	121	99	48	—	940
	1953/54	5,450	321	23	155	4	46	—

(iii) *Other Conservation Measures*

The growing of more effective cover crops—particularly perennial grasses—is steadily gaining ground. The importance of better cover on the soil as a conservation measure cannot be over-emphasized. The following practices all contribute to this end:—

(*a*) Earlier planting.

(*b*) Higher plant population.

(*c*) Higher fertility.

(*d*) Ley rotations.

(*e*) Mulch tillage.

and it is encouraging to note that there is an increasing interest in these measures.

(iv) *Native Cultivation*

Much progress has been made with the control of Native cultivation. In several areas the committees have adopted a definite programme and the results have been most gratifying. In such areas the lands are now "fully protected" and properly sited to avoid any streambank cultivation. In other instances grass strips have been established and further progress can be expected.

Unfortunately, this still remains a major conservation problem on many farms, especially where farmers are afraid of repercussions in the form of losing labour. This is generally not the case as already proved in many areas. Where efficient Native Rangers were employed the progress has been exceptionally good.

(*c*) Mining Claims

Further progress can be reported in respect of Native cultivation on mining claims. In most cases we have had the fullest co-operation of the miners or managers of larger mines and the position is generally satisfactory. In isolated cases it is still difficult to bring about complete control, as for instance in the Penhalonga Valley, but in time these difficulties will be solved.

(*d*) Grazing Areas

(i) *General Management*

There is definitely a greater interest by farmers in proper veld management as more information is now sought from Field Officers and Research Stations. Many farmers have adopted some system of management and with this advantage it is possible to improve the position a great deal.

The grazing areas are of the utmost value to the Colony for the production of animal products and as such require careful attention by the owners of land, I.C.A. Committees and the Government.

(ii) *Mechanical Conservation*

In grazing areas dam construction for the purpose of providing a better distribution of stock-watering points, thus making better management possible and lessening the grazing pressure on river banks continues to be the most important mechanical measure and in this good progress has been maintained as is shown in Table A under section 9 (*a*) below. Both the number of dams built and their aggregate capacity are higher than last year.

(iii) *Veld Fires*

Indiscriminate burning and damage from fires have been worse this year than during the last five years or more. The successive good seasons improved the vegetation and consequently there was more to burn, but the extensive burning that occurred during this year cannot be condoned.

This problem has worried many committees and farmers and only in exceptional cases is the matter under control. There is no doubt that a special effort must be made by all concerned to arrive at a satisfactory solution in the near future.

Heavy losses of stock will no doubt occur due to the destruction of veld by fires this year. In some instances timber plantations have been completely destroyed by indiscriminate burning. The value of fire in veld management is appreciated but it must be a servant and not a master.

(iv) *Bush Encroachment*

Very little progress can be reported in connection with the control of bush. This is a major problem but economic methods of control must still be proved. Where land can be used for arable purposes it pays to clear completely and control the bush subsequently. In the grazing areas, however, the position is different and unless chemical sprays can be proved more efficient, it is difficult to see a solution to this ever increasing problem.

(v) *Established Pastures*

There has been an increase in the planting of Napier Fodder especially in Mashonaland. Farmers have learned the value of this grass if treated as a crop especially for early and late grazing and for silage.

Some farmers have increased their acreages of established pastures by planting Rhodes, Makarikari and Star grasses. In the Eastern Districts Paspelus, Kikuyu and clover pastures have been planted to a greater extent.

The value of Dahl (Pigeon Pea) in the pastures on the sandveld, as proved at the Grasslands Research Station, is steadily sinking in and several farmers are planting Dahl with pastures or in pure stands.

A certain amount of interest is being shown by farmers in irrigated pastures, but this is still mainly in the trial stage. Farmers have had good results from the planting of Nile grass and clovers on the granite vleis in isolated areas.

(vi) *Fencing*

Wherever livestock is of importance in the farming system, fencing is on the increase. Unfortunately, most internal fencing is not yet done on a planned basis but with greater assistance in farm planning the system of fencing grazing areas will also improve.

Many farmers have found that high strain steel wire is perfectly satisfactory for internal fences and it is very much more economical than barbed wire.

(vii) *Timber*

The shortage of coal this year has focused attention on the value of timber for fuel purposes. In the tobacco areas the day is not far off when farmers will be in difficulties about fuel for curing. To overcome this problem, extensive plantings of trees must be undertaken by tobacco farmers. Indiscriminate cutting of timber is controlled by the Forestry Commission and officers of this Department assist with inspections.

(*e*) Roads and Railways

Good liaison with the Railway authorities and the Roads Department continues. The Road councils are trying to avoid the worst erosion but are seriously handicapped in some areas by insufficient funds to meet their obligations and some serious damage is still taking place.

Farm roads continue to take their toll of the soil and a concerted effort is being made to bring them under control by realignment and better drainage.

IX. WATER CONSERVATION

(*a*) Dam Construction

The decline in the number of dams built, reported last year, has been arrested but the total is a long way short of the 1951/52 and 1950/51 totals. It is hoped that the present level may be maintained but this will be governed by the general tempo of farming development, costs and the economic situation. The present trend in the development of summer supplementary irrigation, particularly for such crops as tobacco and maize which enjoy a relatively stable market, is likely to increase interest in dam construction.

Table " A " below shows the figures for dam construction during the past three years. Mashonaland has maintained its lead over other circles but Matabeleland has pulled up to very nearly the same total. The tendency in all circles except Eastern to approach the 5 million gallon capacity dam is interesting. Mashonaland has been coming down towards this figure whilst Midlands and Matabeleland have been coming up towards it.

Table A

Circule	*Period*	*No. of dams*	*Aggregate capacity (gallons)*	*Average capacity per dam (gallons)*
Mashonaland	1951/52	190	1,468,700,000	7,370,000
	1952/53	134	909,000,000	6,770,000
	1953/54	172	976,000,000	5,680,000
Midlands	1951/52	322	848,300,000	2,640,000
	1952/53	132	462,610,000	3,500,000
	1953/54	113	648,000,000	5,730,000
Matabeleland	1951/52	225	609,200,000	2,710,000
	1952/53	137	556,850,000	4,070,000
	1953/54	193	911,600,000	4,720,000
Eastern	1951/52	92	350,000,000	3,810,000
	1952/53	62	329,000,000	5,300,000
	1953/54	57	56,000,000	1,000,000
Totals	1951/52	838	3,276,200,000	3,900,000
	1952/53	465	2,257,460,000	4,850,000
	1953/54	535	2,591,600,000	4,840,000

Table " B " below gives an analysis of these dams showing how they were built. A further substantial increase in farmer-built dams puts this class now in second place with the I.C.A. Committee Units still maintaining the lead. This is a most healthy situation and it is hoped that still more farmers will build their own dams.

Table B

Year	*Farmers*		*I.C.A. Committee units*		*Government units*		*Total No.*
	No.	%	*No.*	%	*No.*	%	
1951/52	180	21.5	415	49.5	243	29.0	838
1952/53	126	27.0	208	45.0	131	28.0	465
1953/54	194	36.5	234	44.0	102	19.5	530

In addition five dams were built by contractors.

Hourly hiring charges for Government Units have been maintained at their previous levels but will increase by 10 per cent. in October, 1954.

(*b*) Catchment Schemes

(i) *Ncema Catchment*

Work in this catchment has continued according to programme and the final recommendations for work under section 23 have been submitted. This work should be completed during the coming year.

There has been a marked increase in the permanent flow of the river into the dam since this work was commenced six years ago. This increase in flow is no doubt partly due to the good seasons but the increased protection of the grass cover and large number of dams constructed in the catchment must have had their effect as well.

(ii) *Karoi Scheme*

Additional dams were constructed under this scheme during the year but due to shortage of funds this project has now been closed.

(iii) *Cashel Catchment*

Work continued in this area and some 18 miles of fencing has been erected for the protection of streams and sponges. The general opinion and indications are that this work has done much to maintain and improve stream flow and to slow down the lowering of the normal water table of the area.

(iv) *Inyazura Catchment*

Work in connection with the fencing of the headwaters of this river was in two parts, one section in the Native area and the other in the European area. The work in the latter area was completed during May, 1953, and there has been a marked improvement in the grass cover of the non-wooded sections.

Some further work, especially erosion control measures, may be necessary within the fenced area of the Native Reserve.

(v) *Matinidza Catchment*

This river is a tributary to the Losapi River and sponge fencing in this area was completed in November, 1953. This sponge area is now again well vegetated and is holding water. Stock trampling has ceased as well as cultivation.

A marsh area, on another tributary of the Losapi River, has been fenced with the result that the water-holding capacity of the area has increased and the stream is flowing steadily.

(vi) *Inyamapambari Catchment*

The fencing work on the headwaters of this river, part of which is in native area has been arranged and will be undertaken during the coming year.

(vii) *Umfuli Catchment*

The programme of work, planned in the Native area, has been carried out and the effects of works in the Mondoro Reserve are most noticeable. Further work in the Native Reserves of this catchment is being undertaken by the Native Department.

(viii) *Umsweswe Catchment*

Good progress has been made with dam construction, gully control, arable land protection and road alignment and drainage in the Native Reserves as well as in European areas of this catchment. Work is still in progress and will be continued during the next year.

(ix) *Sebakwe Catchment*

The work originally planned in this catchment has been completed, but further work may be undertaken under sections 22 and 23 during the next year.

(x) *Umniati Catchment*

Some work on old roads and tracks on Crown Land in this catchment has been undertaken and will be continued during next year.

(xi) *Umwindsi Catchment*

Little progress has been made in this area due to the wet season. Only one small dam was constructed during the year. Streambank and vlei cultivation is, however, being controlled.

(xii) *Mazoe Catchment*

A major gully has been fenced in on one of the tributaries in this catchment.

(*c*) Vleis and Sponges

The payment of subsidy on the fencing of vleis and sponges has definitely encouraged farmers to do more of this work with good results. Very little cultivation of these areas now occurs and there is a steady overall improvement in the management of these areas.

Further investigations in the proper use and management of vleis is of the utmost importance and some research work is now in progress.

(*d*) Underground Water

The position in this respect has not changed during the year. Most boreholes and wells maintained their supplies reasonably well, no doubt due to the three successive good seasons.

The newly settled ranchers in the lowveld were successful in the finding of underground water by drilling. This is most valuable as these ranches would have been useless without this water development.

X. SURVEY OF MECHANICAL UNITS

I.C.A. Committee-owned units continue to do the lions' share of conservation dam construction and though many of these units have fallen by the way there can be no doubt now that to these units belongs much of the credit for the success of the conservation movement.

I.C.A. Units

With one or two exceptions, the I.C.A. machinery units that are still in existence appear to be reasonably stable, and the committees are looking forward to several more years of operation.

One more group, amalgamating four committees, was formed during the year in Mashonaland, bringing the total number of machinery groups in Southern Rhodesia to four. It is noticeable that time lost due to breakdowns is far less for machinery owned by groups than for machines operated individually by committees, taking an average of all units. This can be directly attributed to the fact that groups possess their own repair facilities and, in the case of three groups, transporters.

Although most of the I.C.A. machinery has now completed approximately two-thirds of its optimum working life, the percentage time lost due to breakdowns has increased very little over last year's figure, due mainly to the fact that there has been no need to send tractors all the way from Matabeleland to Salisbury when requiring major overhauls.

A few tractors reached the end of their economical working life during the year and steps have been taken to either dispose of these machines, or replace them with new or second-hand tractors.

The demand for I.C.A. Units has been a lot steadier than the demand for Government Units, as the farmers naturally prefer to support their own Committees.

Government Units

Owing to the sharp falling off in demand for Government Units, it has been virtually impossible for Conservation Officers to plan an economical continuity of jobs. For this reason it was decided, about half way through the year, to reduce our holdings of Government Units to the barest minimum conducive to carrying out our mechanical conservation work as economically as possible.

As units have completed their commitments, they have been handed back to the C.M.E.D. so that, at the end of the year, our unit holdings were reduced almost to the optimum level of:—

Mashonaland	= 4 Units in the field.
Midlands	= 4 Units in the field.
Matabeleland	= 4 Units in the field.
TOTAL	= 12 Units in the field.

It is felt that these 12 units will be more than sufficient to carry out the Department's future dam building and contour ridging commitments, and may even have to be further reduced, though every effort should be made to avoid this.

There was a rise during the year in the percentage time lost due to breakdowns, which was aggravated by a serious shortage of spare parts, particularly in the Midlands and Matabeleland Circles.

Time lost due to other causes showed a marked decrease, undoubtedly due to the lower rainfall and work provided for stumping teams.

New chain harnesses were obtained from the United Kingdom and very satisfactory tree stumping was carried out. However, although this work proved most economical to the farmers, it was evident that a different basis for the hiring of chain stumping teams will have to be arrived at if we are to operate them again, owing to the short duration of each individual job and the excessive amount of plant movement between sites.

Table " D " shows an analysis of the performance of mechanical units. These figures emphasize the continued superiority of I.C.A. Committee-owned units over Government-owned units. They achieved an average of 143 productive hours per tractor per month as opposed to 112 for Government units (including servicing time) and they lost an average of 32.8 hours per month due to breakdowns as opposed to 45.2 hours for Government units.

TABLE D

	All Government Units			*All Intensive Conservation Area Committee Units*		
	1951/52	1952/53	1953/54	1951/52	1952/53	1953/54
Total Hours:						
Average tractor hours per month	213	226	227	231	226	240
Percentage	100	100	100	100	100	100
Productive Work including servicing):						
Average tractor hours per month	100	102.8	112.4	139	121	143
Percentage	470	45.9	49.5	60.2	53.8	59.6
Time spent moving:						
Hours per month	12.2	13.7	14.9	6.5	5.0	6.9
Percentage	5.7	6.1	6.6	2.8	2.2	2.8
Time lost due to:						
Breakdowns	40.5	39.9	45.2	35.8	30.0	32.8
Percentage	19.0	17.8	19.9	15.5	13.4	13.7
Lost time due to:						
Other causes	60.3	68.1	54.5	49.6	69.2	57.3
Percentage	28.0	30.2	24.0	21.5	30.6	23.9

XI. FIELD TRIALS

(i) *Wheat*

Further trials with wheat in the vlei areas of the Charter District were carried out in co-operation with several farmers. The early termination of the rains adversely affected the moisture position and the crops suffered accordingly. Various fertilizer treatments were used and the information obtained will be of value to farmers. These trials will be continued during this year.

(ii) *Maize Variety Trials*

These were continued in all areas in co-operation with the research officers and some valuable information obtained. No final conclusions can be arrived at and the trials will be continued for the benefit of the farmers in the various areas.

(iii) *Cotton Trials*

Further trials were undertaken in co-operation with the cotton research officers in isolated areas, mainly on insect pest control. The results on the whole will be of value to the research officers and to farmers in the future.

(iv) *Fertilizer Trials*

With the assistance of the Chemistry Branch, fertilizer trials were carried out with maize, potatoes, tobacco, lucerne and other minor crops. These trials have proved most popular and valuable to farmers. Most of the trials were successfully carried out in co-operation with the local farmers who were responsible for the management of the soils and crops. Some spectacular results were obtained and the value of these trials cannot be over-estimated. These will be continued in the future.

(v) *Horticultural Trials*

Some trials were also carried out by the Horticultural Officer in the Eastern Districts mainly with fungicides on fruit and vegetables.

(vi) *General*

Several minor trials are generally carried cut by officers in the various areas where farmers and committees are keen on some specific project. Furthermore, demonstration plots are established in co-operation with farmers for visual demonstration purposes of various crops, fertilizer treatments, soil, crop and veld management practices. These demonstrations plots with farmers are extremely valuable to the local communities as the farmers can visit such projects as often as they wish and evaluate results for themselves.

XII. ADVISORY SERVICES

(*a*) General

With the closer integration of Extension and Conservation services, the officers of this Department were able to increase their activities in respect of general farm advisory work. The farmers are seeking the advice of field officers to an ever increasing extent, especially in respect of soil and crop management, livestock management, veld management, pasture establishment, assistance with farm planning and irrigation development.

The principle is now generally accepted that conservation farming embraces the overall utilization of the land and that the building of a dam or contour ridge cannot be separated from the growing of crops or management of the livestock.

Several short courses were organized for officers of the Department at the Research Stations and other centres to ensure that they keep in touch with the latest developments.

The following table reflects the number of visits carried out by officers of this Department in the various Regions:—

	1-10-52 to 30-9-53	1-10-53 to 30-9-54
Attending Intensive Conservation Area		
Committee Meetings	948	1,451
Farmers' Association Meetings	415	437
Advisory Visits	7,177	7,928
Visits to Mechanical Units	2,956	3,888
Pegging Conservation Works	4,413	4,462
Subsidy Inspections	577	580
Water Court Inspections	727	588
Crown Land and Land Settlement Board Visits	592	514
Livestock Improvement Scheme Inspections	370	338
Subdivision Inspections	289	191
Miscellaneous	8,278	9,092
Total	26,742	29,469

(*b*) Farmers' Days

Very successful farmer's days were held in most I.C.A.'s. In some cases committees and the local officers organized more than one small farmer's day in an I.C.A. The value of organized visits by farmers to a farm within their locality to see and study the methods and techniques of their neighbour and discuss common problems are appreciated generally and this practice is stimulating better farming.

We received excellent support from research officers, the Staff of the Tobacco Research Board and the Director of the Pig Industry Board at some of the farmer's days where specific problems were discussed and demonstrations arranged.

(*c*) Shows

Agricultural Shows were held at all previous centres and at Beatrice for the first time. This little country show proved a great success and the farmers and organizers deserve all the credit. At Fort Victoria the first show was held after a lapse of many years and this year's success will no doubt encourage the local farmers to even greater efforts in the future.

The Department staged exhibits at all shows and in co-operation with the Research Division at the major centres.

(*d*) Farmers' Associations

Meetings of farmers' associations were attended by officers of this Department wherever possible and in many instances delivered talks on farming subjects. In some areas the I.C.A. Committees work in close harmony with the farmers' associations to mutual benefit and every effort is being made to bring about closer collaboration in all areas.

(*e*) Teachers' Course

Another teacher's course was organized in co-operation with the Natural Resources Board and the Education Department, to deal with resource education in schools.

The method of approach and instruction was considerably different this year to those previously arranged, and the change was definitely justified. There is a need

for those courses on an increasing scale and further consideration must be given to this matter by the various bodies concerned.

(*f*) Young Farmers' Clubs

This movement is now established on a sound basis and this year marked the establishment of the Federation of Young Farmers' Clubs in Rhodesia. This is indeed good progress and the movement should now be able to draw on public bodies, organizations and individuals for support and guidance.

The main barrier at the moment is the lack of organizers. The only Organizer at present is an officer of this Department and it is humanly impossible for him to attend to all the clubs throughout the Colony. The movement was unfortunately frozen last year because it was not possible to appoint another organizer, and this position still pertains—which is regrettable, if the value of this movement is considered in its true perspective.

There is increased pressure from all over the Colony for assistance to declare clubs already working on their own. The movement cannot remain static and must either grow or be abandoned, the latter is impossible, and therefore, further assistance must be provided in the near future.

Excellent exhibits were staged at the various shows by the clubs and members held demonstrations in livestock, judging, handling of machinery, etc. at some centres.

Three clubs held " Open Days " this year and these were well organized, with public attendance of 20 to over 200 at the Norton Club. These days serve a useful purpose in allowing the public to see for themselves how Y.F.C. aims are put into practice.

(*g*) Grass Nurseries

Farmers continued to obtain planting material from nurseries established in the various I.C.A.'s and in most cases the demand exceeded the supply. With an increasing number of farmers establishing their own nurseries the time will come when the present nurseries will be mainly used as introduction sites and demonstration centres.

(*h*) Agricultural Engineering

There is an ever-increasing demand from farmers for assistance with farm buildings, equipment, machinery and related problems. The staff responsible for this service has been hard pressed to furnish the required information in addition to the duties performed on behalf of the Department. In this respect several houses were constructed for officers in outlying parts and plans prepared for various bulletins published by the Department, as well as assisting other Departments with plans and design of buildings.

Further investigations were proceeded with in respect of mechanical harvesting and other farm mechanization problems. The demand for this service cannot be satisfied at the present time.

XIII. DEMONSTRATION FARMS

(*a*) Chipinga Demonstration Farm

The total rainfall for this year was only 27.13 inches, which is not even half of the previous year. In spite of this low rainfall the season was quite reasonable the rainfall being well distributed until the end of March. Summer crops did very well and a maize crop of 1,200 bags on an average of 15 bags per acre was obtained on the farm.

The winter and spring was dry, which adversely affected the grazing, and heavy feeding had to be done to keep up milk production and maintain the animals. A total 390 tons of silage was made with 1,200 bales of Rhodes grass hay.

In addition green peas were supplied to the factory at Chipinga as well as some tomatoes. Small acreages of pines and guavas have been planted on a trial basis and for demonstration.

The livestock on the station did very well and with culling and selection a more uniform dairy herd will be established. The Jersey herd has been disposed of and only Friesland are now maintained for milk production with a small herd of beef Shorthorns.

Irrigation has been developed on the farm and besides growing some annual irrigated crops, pastures have been established under irrigation to measure and study production and the suitability of these.

Fish ponds have been completed and stocked and these will be utilized to supply farmers in these parts.

Farmers are showing an increased interest in the farm and are calling in regularly to see development and discuss their problems in the light of what is being done on the farm. Visitors from other parts of the Colony called in, when in the vicinity, and there is no doubt that the farm is well supported by all concerned and is serving a most useful purpose.

(*b*) Karoi Demonstration Farm

The total rainfall for the year was 28.89 inches as against 40.02 inches of the previous year. The major portion of the rain fell in January and February and ceased in early March.

The maize crop was good and the yield per acre was 13.7 bags as against 11 bags per acre for the previous year. Trial plots yielded up to 27.3 bags per acre. The total yield of farm maize was 660 bags from 48 acres.

The cotton crop was disappointing, particularly as half of the crop was sprayed for insect pests. The ten acres yielded 2,581 lbs. of seed cotton. Groundnuts gave a fair return of 12.5 bags per acre. Velvet beans and other legumes were grown for stock feed and as green crops. About 400 tons of grass silage was made from the leys.

The dryland lucerne gave three good cuts for silage and has established the fact that lucerne can be grown under dryland conditions, especially if grown in rows.

The livestock did exceptionally well and after the installing of up-to-date dairy equipment only first grade cream has been produced. The flock of sheep has been increased to 111 ewes and the rams are eagerly sought after by the local farmers.

The farming system, which was devised in collaboration with the local Intensive Conservation Area Committees, progressed very favourably and the interest of the local farmers in the work on the station has grown considerably.

(*c*) Whole Farm Demonstration

This project has been furthered this year to the extent that the scheme will now be financed through the Land Bank on support of the Government. Final arrangements are still awaited. It is confidently expected that the first projects will be planned during the coming year.

XIV. S.A.R.C.C.U.S.

During the year, Southern Rhodesia had the privilege of being host to the Third Annual Meeting of the Southern African Regional Committee for the Conservation and Utilization of the Soil.

The organization for this meeting was in the hands of this Department and was finalized in a most satisfactory manner. Delegates expressed appreciation to the Government for the manner in which the meeting and excursions were organized. The meeting completed its business in four days and this was followed by a ten-day excursion to various parts in the Colony, including Native Areas, to enable delegates to see and study land-use methods and erosion control techniques. Officers of this Department greatly benefited by their contacts and discussions with the delegates all of whom are concerned with this important work.

XV. CONCLUSION

The year will be remembered as a year of records, both in maize and tobacco production. With the exception of isolated areas the farming community made considerable gains during this year. As a result of the good season generally, there was greater interest in better farming methods and the advisory officers were kept busy all the time.

The improvement in conservation farming is becoming marked and the delegates to the S.A.R.C.C.U.S. Conference from all over Southern Africa were most impressed with what they saw and learned about our land-use methods and especially with the work performed by the Intensive Conservation Area Committees and farmers generally. This progress is undoubtedly due to the close co-operation between the farmers, the Committees and the officers of this Department for which I am most grateful. We have now entered a further phase in this important programme of farming and we are looking to the future with confidence.

I wish to express my sincere appreciation to all members of my staff for their loyal support and work during the year. To the Natural Resources Board, the Intensive Conservation Area Committees, the Rhodesia National Farmers' Union, the Tobacco Research Board and Rhodesia Tobacco Association, as well as other departments, I am deeply indebted for their kind co-operation, guidance and assistance to my staff and myself during the year.

VETERINARY SERVICES

J. S. Adamson: Director of Veterinary Services

SCHEDULED DISEASES

African Coast Fever

An unlooked for and disappointing recurrence of this disease in the Chipinga District, after freedom of the disease there for seven years, led to consultations and pooling of experience with the South African Veterinary Authorities who were experiencing similar happenings.

These consultations found conclusively, on research work done at the Union Research Stations, that bovines could survive an attack of African Coast Fever without disclosing any great degree of symptoms of the disease and that during that period of illness, ticks on the animal could be infected, which at a later stage could give rise to the disease long after the death of the last detected case of the disease.

The incidence of such cases may be rare but they give the solution to the past reappearance of the disease after it was considered that all infected ticks had died out.

The case for the destruction of all animals in the infected herds is thus strengthened. The infected herd in the Chipinga area, in which the prior detected case was in February, 1947, was destroyed on the reappearance of the disease in 1954.

Believing in the possible rarity of such cases, where the infection is unknowingly prolonged, the remaining herds which were infected in 1947, were not dealt with but intensive supervision over these will continue for some time to come.

Trypanosomiasis

The position regarding this disease, deteriorated during the past year when still more staff had to be assigned for its detection and control.

A very realistic outlook on this disease has to be developed. Its control is dependent on the eradication of tsetse fly from a wide area in the vicinity of animals' grazing grounds. During the year further areas, otherwise suitable for the raising of stock, were denuded of cattle by this disease.

The experience recorded in the last Annual Report, that there is some hope that treatment will give results if " fly " is not abundant, is borne out by the results achieved in the Karoi Settlement where the position has been held during the past year. One further farm was infected but cases dropped from 650 recorded in 1953, to 40 recorded in 1954. Mortality from the disease in the Karoi area in 1954 was one head. Meanwhile it must be appreciated that considerable entomological efforts were being employed in the adjoining areas to prevent a spill-over of " fly " into the Karoi Farms.

Evacuation of cattle, eradication of game and aerial spraying were all employed. Evacuation of cattle is negative action. Eradication of game and thus food supply for the " fly " has the backing of scientific recorded successful results in driving back " fly ".

Aerial spraying has as its basis the fact that the modern aerosol insecticides are lethal to insect life if the technical difficulties of bringing these insecticides in contact with the fly can be overcome.

Meteorological, botanical and geographic conditions have all played a part in the recent aerial spraying operations in reducing the efficient application of the insecticide to the " fly " and modified the optimism placed on this method.

The prolonged period of pupal release of new generations of flies is another of the technical features which makes praying a long and expensive method. Expense alone may preclude this method being a forerunner to trypanosomiasis control.

The rinderpest outbreak of 1896 killed off half a million head of cattle, leaving only 25,000 head of cattle in the Colony. Game also died on a comparable scale. Tsetse fly deprived of its food supply by this catastrophe were eliminated from all of the southern portions of the Colony, and reduced to mere pockets in the Sebungwe, Lomagundi, Hartley and Darwin areas. Tsetse fly can only exist on a blood meal and in game-free, stock-free areas the reduction of tsetse which occurred from Rinderpest can be repeated by starvation methods.

Until the technical difficulties of applying insecticides to tsetse in its living habitat effectively over an adequate period can be solved, and at an economical level, the slower but proved method of game reduction and withholding of other sources of food supply must be continued with if the eradication or control of trypanosomiasis is to be effected.

The trypanosomiasis threat is particularly serious in the Mtoko–Mrewa area. The history of the disease in the Mkota, Chikwizo and Fungwe Reserves indicate the potential danger to the stock-carrying areas on that border. In the Mtoko Reserve the disease already exists on the eastern fringe of the Reserve. Deterioration there on the sudden scale, which occurred at Urungwe, Mkota and Chikwizo, would be calamitous where 40,000 head of cattle are involved.

In the Sebungwe area, the existing occurrence of tsetse is a deterrent to the further development of a stock owning population there.

Recent discovery of tsetse fly on the western bank of the Sabi River may retard the full development of ranching in the Sabi–Chiredzi–Lundi Rivers areas.

It is therefore stressed that a realistic appreciation of the worsening position since 1947 should be made.

The limitations of the benefits of diagnosis and treatment of animals in areas where tsetse fly is existent make it necessary to affirm that the elimination of tsetse fly is the main issue in trypanosomiasis control and that in order to prevent the re-establishment of " fly " heavy settlement of areas reclaimed from tsetse fly must go hand in hand with tsetse eradication methods.

Consideration must be given to the formation of a separate Tsetse Trypanosomiasis Control and Reclamation Unit, similar to that evolved in East Africa, to concentrate on all aspects of tsetse and trypanosomiasis operations.

Tuberculosis

Much work, with very gratifying results has been done over the past year on tuberculin testing of dairy and ranch herds.

The number of dairy herds taking advantage of the Voluntary Testing Scheme increased from 92 to 149 during the year and the number of animals tested, from 7,182 to 13,525 head. Only 71 reactors in 18 herds were detected, indicating the increasing freedom from tuberculosis being arrived at in dairy herds.

The percentage of 0.52 reactors is an encouragement to further dairy herd-owners to dispel their fears of possible heavy infection being disclosed on testing.

Suggestions for a bonus incentive to speed up the total eradication of tuberculosis in dairy herds have not been acceptable, but with the present low percentage of reactors serious consideration should be given to compensation in the case of herds where a higher than normal rate of infection is disclosed on testing.

The voluntary destruction of reactors in a herd, beyond a certain percentage, obviously cannot be acceptable to the owner. The alternative of isolation of infected and disease free animals is also a costly and exacting procedure. It is suggested, when such occasions arise, that it is to the benefit of the producers and the consumer of milk, that compensation be available, otherwise animals from such herds if not tested, would be offloaded on to unsuspecting dairy herd-owners or that milk from a dangerous origin would go into circulation for consumption.

In the previous Annual Report the testing of a Matabeleland Ranch is referred to as giving a 20.5 per cent. reactor result in 29,442 head tested. After elimination of the reactors, later tests in May, 1954, have shown the incidence to be reduced to 3.4 per cent. amongst 14,722 head. After further culling of reactors a repeat test in July, 1954, gave the reactor rate as .54 per cent. amongst 14,236 head.

These excellent results have justified the efforts put into tuberculosis eradication in the herd.

A work of caution is required to be said regarding pasteurization of milk and eradication of tuberculosis and other diseases in dairy herds.

It is commonly asserted that pasteurization renders all milk safe for human consumption. It is agreed that pasteurization is one of the greatest safeguards against the contraction of milk-borne human diseases.

Efficient pasteurization will destroy the bacteria which can set up disease in human beings. Its greatest benefit, however, may be in protecting against bacterial contamination arising after the milk has been released from the udder of the cow, *e.g.* from human carriers of disease or from bad hygienic methods of dairy management.

It will not, however, render wholesome the products of a diseased udder such as pus and toxins. Also it will not eliminate active disease in a dairy herd, or improve hygienic standards of management, which cause economic loss through cost of treatment for disease, mortality reduced production returns and subsequent loss from condemnation at slaughter.

Also it does not ensure that dairy herds can introduce animals from other herds with comparative safety.

Pasteurization allays the consumer's fears regarding disease, but does not ensure his receiving a clean healthy product and does not encourage the producer to develop a healthy herd producing sound milk on the best economic basis.

For these reasons pasteurization should not be used as an argument against eradication of disease and the building up of healthy economic dairy herds.

The eradication of tuberculosis in dairy herds goes hand in hand with the eradication of tuberculosis in the human population. The improving incidence of the disease in the dairy herds of the Colony indicates that the aim of most countries in the world to eradicate bovine tuberculosis could, with comparative little expenditure, be achieved in Southern Rhodesia.

Rabies

There was an increase in the number of cases of rabies during 1954, from 121 in 1953 to 184 in 1954.

Six human cases, unfortunately, were recorded during the year, one European and five Natives dying from the disease.

The majority of the 154 cases recorded in dogs were in *non-vaccinated stray dogs* of the native-owned type. It was decided to vaccinate all native-owned dogs, free of charge, in order to get a better production of dogs in native areas. This led to the vaccination of 121,054 dogs in 1954, as compared with 37,336 dogs in 1953.

Three Canine Destruction units were also approved for the destruction of uncontrolled dogs in " tie-up " areas.

The rabies operations have been going on for three and half years, but it is hoped that the better production of dogs for vaccination, and the organized destruction of stray dogs, will speed up the eradication of the disease.

Foot and Mouth Diseases

The last cases of the outbreak carried over from the previous year occurred in November, 1953, and in March, 1954, all quarantine regulations were removed. All three South African types of the virus had been encountered during the 1953 outbreaks.

On the 13th June, 1954, an outbreak, typed as S.A.T.2, occurred in the southern portion of Bikita District, and on the 16th June, 1954, an outbreak was confirmed in the Fort Victoria District, some 70 miles distant, and typed S.A.T.3.

On August 13th, a further outbreak in the Bikita District was confirmed and typed as S.A.T.3 in contrast to the outbreak of the 13th June, in the southern part of Bikita, which was S.A.T.2.

The virus types involved in the different outbreaks indicate that different virus types must also be present in the wild game in the area and with no cross immunity being observed between these types during the previous year, the possibility of repeated infection exists from game contact.

The 1953 outbreak involved the inoculation of 134,072 head of cattle, and the three outbreaks of 1954 have involved a total of 10,760 head of cattle. All inoculations were completed by 31st August, 1954.

Research Branch Services

Some adjustment of duties between the Field and Research Services were undertaken during the year, to relieve pressure on the latter branch.

The " frozen " post was accepted against the Field Branch by the transfer of a Field Veterinary Officer to Research work.

District Veterinary Officers were made responsible for smear examinations in their own districts.

This has allowed some investigational work to be done on rabies vaccine, contagious vaginitis and epididymitis, agalactia in pigs and other pig conditions. Work was also undertaken on poultry diseases and the improvement of cattle spray races.

Owing to the difficulty of recruiting lay technical assistants, much unskilled work has to be performed by Veterinary Surgeons.

Recommendations to improve this position will be gone into during the coming year.

The condition agalactia in pigs caused some alarm during the year. Pigs farrowed down with no available milk, with the result that many litters died of starvation. The farrowing sows were otherwise normal.

The Field and Research branches collaborated in a series of experiments at various centres. Although the experimental work has not been completed the protein content of a pig feed mixture appears to be incriminated.

The artificial insemination centre is now well organized technically and the service is expanding. The difficulties encountered in maintaining bulls for this service has led to investigating the possibility of importing "Deep Freeze Semen" from the United Kingdom. The results so far obtained, give good hopes of successfully developing this source of supply and obtaining semen from high quality sires.

A second Farmers, Veterinary Short Course was held in 1954, and the popularity and appreciation expressed indicate that it will be a permanent service to be rendered by the Research Branch.

In reviewing the work of the Department over the past year, its increasing volume is noticeable.

Tuberculin testing doubled the past year's figures at 13,525 head of cattle tested.

Rabies vaccinations; at 121,054 dogs done, was nearly six times the number performed in 1953.

Foot and Mouth disease was present in the Fort Victoria Veterinary District for the greater part of the year.

Smear examinations and block inoculations treatment for trypanosomiasis, reached a new high level.

Artificial Insemination services increased and more research investigational work was accomplished.

The Department in all its branches put in a very full year's work and my thanks are due to the staff for the conscientious manner in which they performed their duties.

The usual willing co-operation with other officials of the Service, especially Native Affairs, Police, Law and Tsetse Operations Departments and the Rhodesia National Farmers Union, was very much appreciated.

FIELD SERVICES

General

Rainfall

With the exception of the Bulalima–Mangwe, Chipinga, Bikita and the southern portion of Ndanga District, good rains were recorded. In the early part of the year, only isolated falls were reported but by mid-December general rains had set in. The continuous soaking rains of the previous two years were absent. Although a mean average was struck for the year, rains were erratic in as much that heavy falls of up to 5 inches were reported at a time. In the Districts mentioned, cattle were moved as early as April, on account of open water shortage. Underground supplies, however, were good and failures in boreholes and wells were not reported. Numerous dams failed earlier than expected.

Severe frosts were experienced throughout the country but on the whole the winter was mild.

Grazing

Following upon the heavy rains of the two previous years, grazing was only of average quality and seeded early. By the end of the year only coarse, unpalatable grazing was seen. Extensive veld fires did untold damage and made it necessary for stock-owners to cut down their cattle holdings. Urea and molasses were used for the first time to encourage stock in the eating of course grass and wastes, but lack of experience in the use of such, led to digestive disorders and a few deaths.

Condition of Cattle

With the exception of overstocked Native reserves and certain mismanaged farms, cattle carried through in fair condition.

Mortality from poverty was low.

Tick Life

Tick life continued, and although stock-owners have gained much knowledge of tick control, few practiced the art of efficient dipping or spraying.

The latter form of tick control steadily increased in popularity through the year. Dairy farmers in particular are finding this method of tick control vastly superior to dipping. However, it is obvious that spraying can only be efficiently done if under the direct supervision of a European. Once again it is sad to report that the worst offender in the control of tick life, is the European. The latter being heavily committed in his everyday duties and having a shortage of labour, procrastinates until either an official inspection reveals his shortcomings or the herd is reduced through tick-borne diseases.

Once more it must be reported that, as a result of the inspecting staff being heavily engaged in disease control, routine inspection under the Cattle Cleansing Act was at a very low level. Only regular and sustained inspections throughout the year will keep the less interested stock-owner up to scratch. Again it was fashionable to decry the value of Arsenic, B.H.C. and D.D.T. preparations as tick-destroying agents, but the complainants as a rule are poor dippers.

The Department is very anxious to ensure that spraying will succeed and is carefully watching and advising on improvements.

Quarantine Notices—

Bulawayo 209, Salisbury 257, Fort Victoria 66, Gwelo 101, Umtali 17, Melsetter 83. TOTAL 733.

Contraventions, Cattle Cleansing Act—

Bulawayo 168, Salisbury 111, Fort Victoria 536, Gwelo 7, Umtali 35, Melsetter 63. TOTAL 920.

SCHEDULED DISEASES

African Coast Fever

It is distressing to relate that after almost seven years of freedom from this disease, an outbreak was confirmed on the 10th February, 1954, on the farm Rietvlei in the Chipinga Native District. The last confirmed case of this disease was on the 11th August, 1947, on the farm Ypres. It is worthy of note that Rietvlei was infected during 1947, the last confirmed case being on the 23rd February, 1947.

Since then the Chipinga and Melsetter Districts have been kept under close supervision. In all four deaths occurred from the disease; the slaughter policy was decided upon and the cattle, 288 in number, were slaughtered at the Cold Storage Commission abattoir, Fort Victoria, by the 24th March, 1954, and the owner compensated.

It is hardly possible for the disease to have simmered on this farm as all deaths have been accounted for except three, which occurred in 1953 and on which no post-mortems were made and no smears produced. It can only be assumed that the sterile immunity previously ascribed to this disease does not exist under field conditions.

Theileriosis

The incidence of this disease decreased during the year. However, mortality was still high, particularly in the better bred bovine. The policy adopted is that on confirmation of the disease, the farm is quarantined and short interval dipping and hand-dressing enforced.

Slaughtering of sick animals is not enforced, indeed every help is given in effecting a cure should the owner so desire. However, it is considered that this curative practice has little to recommend it as history has proved that the recovered animal is a carrier of the disease and can act as a focus of infection when purchased by an inefficient dipper.

During the peak period of ticks, all previously infected farms are carefully watched. This of course takes up a considerable amount of time and personnel.

	Outbreaks	*Deaths*
Bulawayo	1	11
Salisbury	16	179
Fort Victoria	7	146
Umtali	8	35
Melsetter	1	2

TOTAL=33 outbreaks resulting in 373 deaths, in comparison to 39 outbreaks and 559 deaths the previous year.

Anthrax

Bulawayo—One outbreak with a mortality of six confirmed on a European farm. One outbreak with a mortality of eight confirmed in a native reserve.

Anthrax vaccinations—20,729 head of stock.

Salisbury—One outbreak on a European farm with a suspected mortality of 18 head, and one outbreak in a Native reserve with only one death.

Anthrax vaccinations—49,297 head of stock.

Fort Victoria—One outbreak on a European farm causing a mortality of nine.

Anthrax vaccinations—13,020 head of stock.

Umtali—Outbreaks confirmed on two farms causing two deaths.

Anthrax vaccinations—1,396 head of stock.

Gwelo—No outbreaks

Prophylactic inoculation—710

TOTAL OUTBREAKS 7. Mortality of 44.

TOTAL ANTHRAX vaccinations— 85,152.

Foot and Mouth Disease

The year began with active infection in the Chipinga District and this portion of the Report is merely a continuation of the previous Annual Report.

Four further farms in the Chipinga Native District and one in the Melsetter District became infected, involving 2,454 head of cattle. The last farm was inoculated with field virus on the 24th November, 1953, and by the end of March all restrictions were removed. The virus involved was typed as S.A.T.1. and the outbreak was an extension from the original Humani focus. Altogether 134,072 head of cattle were inoculated in this outbreak.

From this period until the 13th June, 1954, when infection was confirmed amongst 1,043 head of cattle at Hammond's Dip in the Bikita District and Ngundu Section, Nuanetsi, on the 16th June, the country remained free from infection.

The year opened with a cordon in place round the south-eastern dips in Ndanga Reserve—namely Gadziso, Fue, Panganayi, Muru, Cheridzana, Makobvu, Sewure, Musuche and Mungesi. This cordon was lifted at the end of October and all Special Native Constables discharged. Quarantine restrictions were removed from the Bikita and Ndanga Districts at the end of December.

Hammonds Dip—Owing to the drought 1,043 cattle were moved from Humani Ranch to Hammond's Dip on the Mkwasini, early in May. Except for a small herd of native cattle the area had been free of cattle since 1947. This native herd was within half mile of the infected cattle and had, about a month previously, been watering in the same pools. These cattle did not contract the disease, having been inoculated with S.A.T.2 and 3 virus the previous year.

Also watering at these pools were large numbers of buffalo, sable, kudu, eland, impala and other game.

Lesions were very mild, with practically no lameness and little salivation. It was also immediately evident that there was a high degree of immunity in certain stock. This was not altogether surprising since Humani Ranch was infected with S.A.T.1 virus in 1953 and S.A.T.2 in 1952. Also some of the cattle had been through the 1947 outbreak when S.A.T.2 virus was identified.

The virus now infecting the 1,043 Humani cattle was found to be S.A.T.2.

Percentage infection—natural and following inoculation was very low. Of 39 old oxen, only seven showed lesions. In the heifer herd infection was 75 per cent., and in a herd of 130 cows and calves, there were 29 visible cases, of which 27 were calves and two were cows. A check on the 13th day after inoculation showed no wet lesions.

Thirty Special Native Constables and cattle guards were employed on this cordon. No spread took place and the cordon was lifted on the 30th July, but cattle guards were kept for a further month.

Ngundu Nuanetsi Section—On the 16th June infection was detected in a herd of native cattle on Ngundu Section of Nuanetsi. The following day the disease was found in a herd of Rockwood cattle kept on the Tokwe, and in contact with the Ngundu cattle.

The disease was not fresh, but owing to its extreme mildness accurate "ageing" was a matter of guesswork. It is probable that the first cattle to become infected had been the homestead herds. Inoculation of cattle was quickly effected.

Reactions were extremely mild, particularly the feet where frequently only one foot was visibly infected. Only in the few exotic animals was the disease readily visible. No slippering took place and salivation was minimal. Visible infection was never above 50 per cent., and reinoculation produced no additional cases.

The virus was typed as S.A.T.3, which was last known to be active in Ndanga Reserve in August, 1953.

The cattle included within the cordon were those on Hillandale, Rockwood, Ngundu, Nuanetsi Section, and the Mbangamakwe native stock, a total of 1,619. These cattle, being the contacts between the low veld and the northern Native reserves, had been excluded from recent cordons. They had not been infected since 1951, when the Mbangamakwe cattle only were involved.

An initial cordon of 98 Special Native Constables was placed, this being reduced to 40 at the end of July. These remaining 40 S.N.C.'s were transferred to Matsai Reserve at the end of August, no spread having taken place.

Angus Ranch—Matsai—On the 13th August, infection was reported in the Angus Ranch cattle grazing in the region of Chikopo Pool on the Mkwasini. Angus Ranch had been on bi-weekly and finally weekly inspection since the Hammond's Dip outbreak on the 13th June. Unfortunately, due to a mechanical breakdown of the inspector's vehicle the previous week, only half the Angus Ranch cattle had been seen on that occasion. It was discovered later that infection had been present in one herd on this occasion.

The disease was well established when confirmed, more particularly as these cattle watered either in the one remaining pool or from a drinking trough. As in the case of Hammond's Dip outbreak, hundreds of game were also watering at these two points.

It was immediately evident that this disease was more virulent than that encountered at Hammond's Dip or Ngundu Section. Furthermore, cattle of all ages were infected, including old native oxen. When examined by the District Veterinary Officer on the 14th August, there was already an 80 per cent. infection in the southern herds, and 65 per cent. in the herds adjacent to Matsai Reserve.

Mouth lesions were particularly severe with large sloughs of foul-smelling pieces of epithelium. When collecting virus for typing, the initial pieces of epithelium were discarded as being putrid, but it was soon discovered that all pieces had this foul smell.

Several carried their tongues protruding from their mouth. Feet lesions and general systemic effects were also severe.

As was to be expected from the watering facilities, one pool and one trough, the spread was extremely rapid.

The problem now arose as to what virus was present. Angus Ranch cattle had a virulent infection—95 per cent. reaction—in 1953 with S.A.T.1 virus, and had succumbed to S.A.T.2 virus in 1952. The present symptoms, however, did not resemble that S.A.T.3 lately found at Ngundu, and again it was only 15 miles from the recent Hammond's Dip outbreak which had been typed as S.A.T.2. The final typing of the virus as S.A.T.3 was received with much satisfaction—exonerating us from a slip-up at Hammond's Dip.

The cordon surrounding Ngundu Section was lifted immediately and placed between Angus and Matsai. The 1,104 head involved were inoculated on the 16th.

The attempt to save Matsai Reserve, however, was too late and the first cases were detected on the 20th at Gawa and Wudzi on the 21st, these being six and one case respectively.

The infection of Matsai, although expected, presented a serious threat. Owing to the poor season, both grazing and water were abnormally scarce.

By the 30th August, the cordon had been altered to include Matsai, delay being due to a shortage of Special Native Constables and the inoculation of 8,098 head was completed on the 31st.

In contrast to Angus Ranch European cattle, reactions were mild. Feet lesions were difficult to detect and practically no slippering occurred. Mouth lesions were severe with extensive vesiculation, but little of the typical ropey salivation. A sticky frothy type of salivation around the lower lip being frequently all that was visible. Visible percentage infection never exceeded 64 per cent.

It is interesting to note that Angus and Matsai have had the following infections:—

1952	S.A.T.2
1953	S.A.T.1
1954	S.A.T.3

At the end of September a cordon of 60 Special Native Constables was in position and included cattle on the south-western half of Angus and Matsai Reserves. Quarantine areas were as published in F.G. Notice No. 150 of 2nd July, 1954. The Bikita, Ndanga, Nuanetsi and southern parts of the Victoria and Chibi Districts remained in quarantine.

Persistence of Infection

It is the opinion of the District Veterinary Officer that all three outbreaks were due to persistence of infection in game. The two Mkwasini ones, Hammond's Dip and Chikopo Pool, there can be no doubt about, since this area is unoccupied and waterless for much of the year. No cattle traverse this area even when trekking. Infection could not have survived in the native herd adjacent to Hammond's Dip since they dip in Sangwe Reserve and were present there the week prior to the outbreak, for inspection at a sale from which no infection was carried. Furthermore, they reacted to S.A.T.2 and 3 types in 1953. Buffalo were never present on Ngundu or Rockwood but a herd of eland moved into the area prior to the outbreak. Kudu and bush pigs are normally present, though these species usually remain fairly localized in their movements.

Quarantine Restrictions

Quarantine restrictions have not interfered with the marketing of cattle to any appreciable degree. Loadings have continued from the low veld and Devuli, except for half a dozen postponements for a few weeks. Only in Ndanga Reserve did the cancellation of the last six days of a scheduled ten-day sale interfere with the disposal of surplus stock. This Reserve did not take advantage of earlier sales to the same degree as the other Reserves.

Trypanosomiasis

Once again a high priority was given to the detection, treatment and control of this disease.

Urungwe Native District

Following upon the removal of cattle from the Urungwe Reserve and the Manyangan Crown Lands, the general trypanosomiasis position improved considerably on the Karoi Block, and can be viewed with sober satisfaction. Admittedly three cases occurred on one farm close to the Catkin Chamber and one case on another farm. The infected animals were slaughtered for rations and the cattle moved back from the vicinity of the Chamber. On one farm in the block persistent recurrent cases occurred and the owner decided to slaughter off the whole herd and restock after a year.

By the end of the year 28 farms were infected, an increase of one over the previous year. In all 40 cases were confirmed, a considerable drop over the previous year when 650 cases were recorded.

Originally there were 3,341 head of cattle on the infected farms, dropping to 2,123 last year and increasing to 2,185 by the end of the year under review.

A decision was taken to experiment with aerial spraying, using three aircraft, in a restricted area west of the Urungwe Reserve. Operations commenced on the 30th November, 1953, and terminated towards the end of March, 1954. The interval between applications being in the first instance 24 days and later 14 days.

Spraying operations were discontinued because of the poor penetration of aerosol, owing to foliage, poor kill, distance from aerodrome to site of operations, bad flying conditions and general atmospheric turbulence. In July of 1954, operations were resumed, using five aircraft. In the early part of these operations, estimated kills of 85 per cent. were made. However, the area to be sprayed had to be reduced considerably owing to poor flying conditions reducing the number of sorties.

Operations are still continuing.

Mtoko Native District

Mtoko Reserve—In this Reserve there are six foci of infection, 22 cases were confirmed and 19 deaths occurred, a slight improvement over the previous year. Owing to the presence of tsetse fly in adjacent Crown Land it was decided to fence the north-eastern boundary of the Reserve, to prevent cattle grazing into Crown Lands.

Chikwizo Reserve—The steady deterioration previously reported continued during the year. It was possible to remove approximately 400 head of cattle for slaughter purposes. Of the original 1,947 head in the Reserve when infection was detected, only 304 now remain. A total of 66 cases was confirmed and 214 deaths reported. It is only a question of time until the herds are wiped out.

Mrewa Native District

Fungwe Reserve—During May, infection was detected in the Fungwe Reserve. A blood smear survey later revealed a high percentage of infection at four points ranging from 5 to 25.3. per cent.

All infected and incontact cattle were treated, 3,120 inoculations being performed. Later, tsetse flies were detected on the Nyadire River and cattle previously watering there were removed to inland water. Arrangements have been made to fence off the north-eastern portion of the Reserve and withdraw to the south and west the cattle which are in that area.

Wankie Native District

The area has been well covered by foot patrols. Isolated pockets of cattle, where infection existed, were inoculated with dimidium bromide in all 960 head of stock were treated.

Ndanga Native District

A serious deterioration occurred in the Ndanga East Reserve during the year. At Rupangwane, 18 cases were confirmed and it is considered that 44 head died from the disease. Two cases were detected at Ndari and both centres comprising 2,241 head of cattle were block inoculated.

G. Pallidipes was caught north of Chitsa.

Sebungwe Native District

Although a new centre of infection was confirmed on the Kana, the position is satisfactory. In all 66 cases were confirmed and 1,765 head of cattle were inoculated.

A programme of fencing has been decided upon, to prevent stock straying into fly-infested pockets

Chipinga Native District

In all, 16 cases were detected on European farms and 107 in Native areas. One further European farm and one Native area became infected A definite deterioration is recorded here.

Inyanga Native District

Early in the year, a blood smear survey of the northern concentrations in the Inyanga North Reserve revealed 19 positives. A similar survey in May, 1954, revealed 104 positives, whilst two cases were detected elsewhere in the reserve. The latter were animals which had moved from the northern concentrations. In all 1,116 head were inoculated.

During the year a total of 67,452 blood smears were taken and examined for trypanosomiasis.

Rabies

The following cases were confirmed during the year :—

Native District	*No. of cases*	*Date last case*	*Species involved*
Belingwe District	3	14– 7–54	dogs
Bikita	3	9– 7–54	1 dog, 2 human
Bubi	1	26– 3–54	dog
Bulalima Mangwe	8	20– 9–54	dogs
Bulawayo	14	2– 9–54	dogs
Chipinga	1	24– 6–54	dog
Darwin	4	29– 4–54	1 hyaena, 3 dogs
Goromonzi	2	11–11–53	1 jackal, 1 dog
Gutu	1	16– 7–54	dog
Gwanda	2	30– 8–54	dogs
Gwelo	9	25– 9–54	dogs
Hartley	1	24– 6–54	dog
Inyanga	8	20– 9–54	dogs
Lomagundi	33	19– 8–54	1 human, 2 sheep 2 bovine, 1 horse, 3 jackals, 24 dogs
Lupane	1	26– 7–54	dog
Makoni	12	6– 9–54	1 human, 1 bovine 1 cat, 1 jackal, 8 dogs
Marandellas	10	14– 7–54	2 bovine, 1 donkey 7 dogs
Matobo	2	24–12–53	dogs
Mazoe	26	25– 6–54	2 human, 2 bovine, 22 dogs
Mrewa	6	14– 7–54	dogs
Mtoko	4	11– 8–54	1 bovine, 3 dogs
Ndanga	3	13– 8–54	1 sheep, 2 dogs
Nuanetsi	3	14– 9–54	dogs
Nyamandhlovu	2	18– 1–54	dogs
Salisbury	7	29– 9–54	1 cat, 2 jackals, 4 dogs
Shangani	1	2– 7–54	dog
Umtali	11	3– 8–54	dogs
Urungwe	3	4– 8–54	dogs
Victoria	2	27– 8–54	dogs.

TOTAL cases confirmed during the year=183.
Results according to species being=Human 6, dogs 154, cats 2, jackals 7, bovine 8, sheep3, hyaena 1, horse 1, donkey 1.
TOTAL cases confirmed since outbreak=616

From this it will be seen that not only has the number of confirmed cases increased but also a larger area of the Colony was involved. During the year 121,054 dogs were inoculated, bringing the total of dogs vaccinated since the outbreak to 338,936. Despite these impressive figures of dogs vaccinated, it is my considered opinion that in certain areas the production of dogs has been much lower than the 70 per cent. considered the minimum figure for vaccination to be effective for control. During the year authority was given for native-owned dogs to be vaccinated free of charge and this should ensure that more native-owned dogs are brought forward for vaccination.

Three Canine Destruction units have been functioning since May, and have patrolled the various areas where tie-up orders have been promulgated. Their presence has certainly helped to enforce these orders and at the same time has resulted in the elimination of many ownerless dogs.

Once again there have been several instances of inoculated dogs developing rabies. On analysing the figures it is seen that 11 dogs were vaccinated less than three months before death, two over three months but under six months, and 14 were inoculated over six months prior to their dying from rabies. Of these 14 dogs, five were inoculated in 1951 and hence immunity conferred would either be at a very low level or have disappeared completely. Consequently it is seen that there were definitely nine cases in which the vaccine did not give adequate protection. When this figure is compared with the total of confirmed cases of rabies and the total of vaccinations carried out it is obvious that the vaccine has been an extremely valuable adjunct in the control of rabies.

It must be emphasized that rabies cannot be eliminated from the Colony without the co-operation of the public and unfortunately in many areas this has not been forthcoming, or has only happened when the dangers of the disease have been vividly demonstrated to them after several cases have occurred in their neighbourhood.

Only when all dog-owners realize their responsibilities and fulfil them by observing the regulations, can we hope for the final eradication of rabies. Until then cases will occur and the majority will suffer for the criminal neglect of a few self-centred and ignorant people.

Tuberculosis:—

A.	Importations—Total tested 1,862.	Reactors 17	
B.	Exportations—Total tested 2,337.	Reactors and inconclusive reactors 57.	
C.	Umtali Eradication Scheme:—		
	Scheme A—Number of farms	7	
	Number of cattle	745	
	Number of reactors	nil	
	Scheme B—Number of farms	3	
	Number of cattle	551	
	Number of reactors	1 (slaughtered)	
D.	Voluntary Scheme:—		
	Umtali —Number of herds tested	30	
	Number of cattle tested	2,208	
	Number of reactors	3 (includes two tested prior to addition to a tested herd)	
	Bulawayo—Number of herds tested	33	
	Number of cattle tested	1,975	
	Number of reactors	15 in five herds, (11 in one herd)	
	Salisbury —Number of herds tested	57	
	Number of cattle tested	6,455	
	Number of reactors	36 in six herds (29 in one herd)	
	Gwelo —Number of herds tested	9	
	Number of cattle tested	887	
	Number of reactors	15 in three herds	
	Melsetter —Number of herds tested	10	
	Number of cattle tested	704	
	Number of reactors	1	
	Total number of herds tuberculin tested	149	
	,, ,, ,, cattle ,, ,,	13,525	
	,, ,, ,, reactors ,,	71 in 18 herds	
	Percentage of reactors	0.52 per cent.	

When these figures are compared with those for the corresponding period of the previous year, it will be realized how rapidly the number of tuberculin tested herds is increasing (1953—92 herds and 7,182 head tested) (1954—149 herds and 13,525 head tested). It must be borne in mind that, apart from the Umtali Eradication Scheme, no financial incentive is offered, and even under that scheme the compensation paid for reactors slaughtered does not fully cover the losses sustained by the farmer.

If some incentive, such as a bonus on milk produced from tuberculosis free cows, was offered the number of tuberculin tested herds would increase tremendously and with the incidence of tuberculosis being so low, Southern Rhodesia could in a few years, become the first country in Africa where the disease has been eradicated from dairy herds. Apart from eliminating the losses caused by the disease this would also ensure that the milk supplied to the consumer was a purer product.

The records of the tests show that to date only a few herds were heavily infected, and any scheme to eradicate this disease should start immediately when the incidence is low. Delay will only result in spread of tuberculosis so that the eradication policy, which must eventually be brought in, will be more costly and will take longer in achieving its object.

Meanwhile, credit is due to those farmers who are wise enough to realize the dangers of this insidious disease and also to the various members of the Department, past and present, whose foresight has ensured that the incidence of tuberculosis is at the present low level.

Two further tests were carried out on three sections of a large ranch in Matabeleland, the results being May, 1954—14,722 head tested with 506 reactors, July—14,236 head tested with 78 reactors.

Meat Inspection Incidence:—

Bulawayo	Bovine	37
	Porcine	66
Liebigs Factory	Bovine	252
	Porcine	nil
Umtali	Bovine	1
	Porcine	9
Fort Victoria	Bovine	2
	Porcine	10
Salisbury	Bovine	6
	Porcine	3

Heartwater

Bulawayo 52

Fort Victoria 32 TOTAL 84.

This is considered to be a low figure; Stockmen in heartwater areas are well acquainted with the disease and rarely report deaths.

The heartwater vaccinations, reported the previous year on a ranch in the Gwanda District, did not continue this year owing to lack of Veterinary supervision in the preparation of the vaccine.

Piroplasmosis

Confirmed cases as follows:—

Bulawayo	11
Salisbury	36
Fort Victoria	8
Gwelo	12
Umtali	17
Melsetter	54
TOTAL	158

With the exception of the Melsetter figures, the returns from the other stations are considered to be only a fraction of the actual incidence of this disease. In the previous year the incidence was 367. The disease is familiar to all stock-owners and as a result losses are seldom reported.

Swine Fever

This disease was confirmed clinically on a farm in the Lomagundi District. In all 221 pigs were slaughtered and burned on the spot. No extensions from this outbreak were recorded. Full compensation was paid to the owner.

Quarter Evil

Outbreaks were confirmed as follows:—

	Outbreaks	*Deaths*
Bulawayo	50	219
Salisbury	49	279
Fort Victoria	11	108
Gwelo	27	93
Umtali	15	63
Melsetter	18	54

Again it is emphasized that the above is not a true reflection of the actual position. This condition is easily diagnosed and stock-owners promptly inoculate to prevent further deaths. Annual immunization is only practised by the minority.

An assortment of vaccines is obtainable on the open market and at times doubts have been entertained regarding their efficacy. One product was taken off the market after laboratory tests. Government vaccine is held at all district offices for sale to the public.

Contagious Epididymitis and Vaginitis

During the year, new centres of infection were confirmed as follows:—

Bulawayo 9, Salisbury 25, Fort Victoria 3, Umtali 1, TOTAL 38.

Releases from quarantine were—Bulawayo 11, Salisbury 13, Fort Victoria 6, Gwelo 2, Melsetter 1, TOTAL 33.

In quarantine at the end of the year—Bulawayo 25, Salisbury 79, Fort Victoria 8, Gwelo 9, Umtali 1, Melsetter 2. TOTAL 124.

In fact at the end of the year, there were seven more farms in quarantine than the previous year. It is admitted that the number of farms in quarantine is a formidable figure and makes depressing reading but at the same time it is emphasized that an all-round improvement is noted in the infected herds although no spectacular advances can be claimed. The concentrated efforts of the Field Staff in the Salisbury District, working in close collaboration with the Research Branch, continued throughout the year. Recent findings have thrown little light on this condition, indeed the picture has become more complicated than previously.

The great necessity is a reliable diagnostic test. At present diagnosis and treatment of infected herds is based on the clinical picture, which in itself is not sufficient evidence particularly before release from quarantine.

Contagious Abortion

Infection was confirmed on premises as under:—

Bulawayo 8, Salisbury 61, Gwelo 6, Fort Victoria 24, Umtali 7, Melsetter 3. TOTAL 109 premises.

Six thousand and eighty-five blood samples were taken, giving 476 reactors.

Over the last two years, efforts have been made to make the farming community more conscious of this disease and to encourage annual inoculation with S.19, now that an assured supply of this vaccine is available. The response has been slow but it is evident that greater interest is being taken. The vaccine has been proved beyond all shadow of doubt in other countries and it is lamentable that greater use has not been made of it in this country.

At one time all heifers distributed by the Cold Storage Commission were tested and vaccinated, but unfortunately the practice has now ceased.

Sheep Scab

Six outbreaks confirmed and quickly brought under control.

Senkobo Skin Disease

The disease was reported from the Wankie and Sebungwe Districts. Mortality was negligible.

Lumpy Skin Disease

Very rare cases of Lumpy Skin disease have been noted. The lesions were extremely mild.

SCHEDULED POULTRY DISEASES

Spirachaetosis

Confirmed one outbreak only.

Coccidiosis

A total of 19 outbreaks confirmed. This condition is more prevalent than is indicated by the above figure, as many owners diagnose and treat the disease without reference to the Department.

Fowl Typhoid

Bulawayo	8	outbreaks with	a mortality of 1,090
Salisbury	7	,, ,,	low mortality
Gwelo	8	,, ,,	a heavy mortality on two premises
Umtali	1	,, ,,	a mortality of 13.

TOTAL of 24 outbreaks.

Bacillary White Diarrhoea

The practice of testing flocks continued throughout the year. A total of 164 B.W.D. free certificates were issued, covering 86,258 birds. A further seven premises, where infection existed, were regularly tested to eliminated infection.

Only one outbreak was confirmed amongst chickens imported from South Africa.

Fowl Cholera

An outbreak was confirmed amongst native fowls in the Hartley District. A heavy mortality was reported, survivors and incontact birds, in all 829, were slaughtered and burned.

A further outbreak in ducks was detected in the Salisbury District. Before any spread occurred, the ducks 78 in number, were slaughtered.

Newcastle Disease

It is indeed pleasing to report that, following upon the mass vaccination of fowls in the infected areas of Bulawayo and Wankie in late 1952 and early 1953, no further evidence of the disease has been detected. The vaccine used was the Komarov strain.

Chicken Pox

Few outbreaks of any significance were detected.

NON-SCHEDULED DISEASES

Anaplasmosis

Cases have been confirmed as follows:—

Bulawayo 93, Salisbury 263, Gwelo 43, Umtali 38, Melsetter 37, Fort Victoria 51. TOTAL 525.

To date, no specific treatment has been discovered to deal effectively with this disease. A number of new preparations were tried during the year, but with poor results.

Admittedly, prevention is better than cure, and the stockowner has the answer in efficient dipping.

Paratyphoid

Six outbreaks were confirmed. More use has been made this year of prophylactic vaccination than ever before.

Geilsiekte

Outbreaks fewer than usual. Several cases occurred on one farm at Umtali and treatment was successfully carried out.

Horsesickness

Cases were confirmed as follows:—

Bulawayo 4, Salisbury 4, Gwelo 3, Fort Victoria 1. TOTAL 12.

During the previous year 125 cases were recorded. Vaccination of horses was practised to a larger extent following the previous years' losses.

Biliary Fever (Horses)

Only four cases recorded.

Sweating Sickness

Fewer cases seen than in previous years. It is considered that the reduction in incidence is due to the use of the new insecticides.

Myiasis

Incidence less than in previous years. The credit has been given to the use of the new insecticides.

Ophthalmia

This condition is widespread.

CATTLE

Coccidiosis

Few outbreaks reported. In all cases the outbreaks followed upon the change from veld grazing to penning and supplementary feeding. No deaths occurred.

Agalectia in Swine

This condition was reported from both the Umtali and Victoria Districts only. It is estimated that at least 2,000 piglets succumbed.

Feeding experiments were carried out and it became obvious that the condition was of a dietetic nature.

Verminosis

Mortality and general loss of condition, particularly in young stock, was marked. Members of the Department are constantly advising on preventative and curative treatment. Only when mortality occurs is the latter taken up but little is done in the way of prevention. Routine dosing of stock is adopted only by the few.

Ephemeral Fever

Little recorded and no mortality reported.

Poisoning

Arsenic..Bulawayo 17, Salisbury 211, Fort Victoria 11, Gwelo 52, Umtali 58 Melsetter 51. TOTAL 400.

Mineral..Various—74 head.

ARTIFICIAL INSEMINATION

Semen was issued throughout the year by the Veterinary Laboratory. In and around Salisbury inseminations were carried out by an Inseminator operating directly from the Laboratory. In Bulawayo a substation was started during the previous year, using semen from Salisbury.

It was felt at the time, that for the control of contagious epididymitis and vaginitis, every effort should be made to encourage this service. However, as artificial insemination was only used at first in disease-infected herds, it stands to reason that the conception rate was low. Owners of non-infected herds were prevailed upon to participate and after training, semen was made available. In all, 564 doses were sold.

Some half-a-dozen dairy farmers in the vicinity of Bulawayo obtain semen from an approved private artificial insemination centre.

At the end of the year, arrangements were completed and artificial insemination substations were opened at Gwelo and Umtali.

MEAT INSPECTION

The inspection of meat for human consumption is undertaken by the Veterinary Department at the Cold Storage Commission abattoirs at Bulawayo, Fort Victoria, Salisbury, Umtali and Liebigs Canning Factory at West Nicholson. A total of 291,235 carcases was examined.

Authority was granted to increase the inspection staff by two, but, unfortunately, no appointments were made. The Meat Inspectors come under the direct control of the local District Veterinary Officer and as a result are in close touch with the Field Staff, and are therefore in a position to pass on useful information collected at the abattoirs, for application on farms.

It is with pleasure that I acknowledge the help and co-operation given by the Departments of Health, Native Affairs and Police.

In conclusion, I wish to express my thanks and appreciation to all members of the staff for the hard and willing work they have carried out during a trying year.

STOCK SLAUGHTER FIGURES

	Cattle	*Pigs*	*Sheep and goats*
Salisbury	58,972	59,547	15,702
Bulawayo	58,287	26,513	203
Umtali	6,253	9,913	2,940
Fort Victoria	28,331	6,354	749
West Nicholson (Liebig's)	16,668	703	—
	168,511	103,030	19,694

CARCASE CONDEMNATION

	Cattle	*Pigs*	*Sheep and goats*
Salisbury	775¼	73½	52
Bulawayo	605	285	—
Umtali	98	45	10
Fort Victoria	878¼	—	—
West Nicholson	60	3	—
	2,416½	406¼	62

Main Reasons for Condemnation

	Cattle	*Pigs*	*Sheep and goats*
Emaciation	674	20	53
Measles	650	313	—
Oedemo	591	—	—
Sarcocysts	123	—	—
Bruising	26½	—	—
Pleurisy—Peritonitis	95½	—	—
Pyaemia	25	—	—
Septicaemia	—	11	—
Tuberculosis	—	9	—

Cattle Census and Dipping Tanks

	European	*Native*	*Total*	*Dip tanks*	*Spraying*
Salisbury	356,598	318,035	674,633	1,608	454
Bulawayo	396,652	663,357	1,060,009	1,137	135
Fort Victoria	140,221	428,363	568,584	528	5
Gwelo	226,811	259,996	486,807	812	3
Umtali	72,733	138,669	211,402	406	18
Melsetter	54,400	43,475	97,875	236	—
	1,247,415	1,851,895	3,099,310	4,727	615

C. Importation of Livestock 1953/54

	United Kingdom	Union of South Africa	Bechuanaland Protectorate	Eire	Northern Ireland	Sweden	Northern Rhodesia	Nyasaland	Total
Bulls	15	400	—	—	—	—	—	—	415
Bulls (slaughter)	—	—	88	—	—	—	—	—	88
Cows and calves (breeding)	70	955	—	—	—	—	5	3	1,033
Cows (slaughter)	—	—	71	—	—	—	—	—	71
Oxen (slaughter)	—	—	1,062	—	—	—	—	—	1,062
Stallions and Mares	3	109	—	2	2	—	2	—	118
Geldings	—	410	—	—	—	—	3	—	413
Mules	—	49	—	—	—	—	—	—	49
Pigs (breeding)	—	10	—	—	—	17	—	—	27
Pigs (slaughter)	—	—	153	—	—	—	—	—	153
Sheep (breeding)	—	550	—	—	—	—	—	—	550
Goats (breeding)	—	138	—	—	—	—	—	—	138
Sheep and goats (slaughter)	—	—	11,993	—	—	—	—	—	11,993

Exportation of Livestock, 1953–1954

	Northern Rhodesia	Nyasaland	Belgian Congo	Union of South Africa	Bechuanaland Protectorate	Portuguese East Africa	Total
Bulls	75	7	46	5	14	3	150
Cows and calves	553	49	1,364	—	—	7	1,973
Oxen	—	—	—	—	—	81	81
Mares and Stallions	3	—	—	7	—	—	10
Geldings	18	6	12	15	3	—	54
Mules	39	—	—	—	—	—	39
Donkeys	100	—	—	38	—	—	138
Pigs	101	—	16	—	—	15	132
Sheep	3,284	31	230	—	—	—	3,545
Goats	1	—	—	—	—	—	1
Poultry	103	—	—	—	—	3,400	3,503

RESEARCH

Routine Services

As in the past, these very essential services are dealt with under three headings:— (*a*) diagnostic, (*b*) preventive or curative and (*c*) artificial insemination.

Diagnostic Services

Smear Examination

This branch no longer deals with field smears, except those prepared from animals undergoing redwater and gallsickness inoculation with vaccine supplied from the laboratory, those submitted for confirmatory diagnosis or accumulations of smears, which cannot be dealt with expeditously in connection with trypanosomiasis surveys. This diagnostic procedure should therefore become a comparatively minor, though still very important, function.

Nevertheless, 6,777 smears from the field, including 2,169 for trypanosomiasis determination, were received and examined, diagnoses of scheduled diseases being made as under:—

Piroplasmosis	23
Theileriosis	18
Anthrax	4
East Coast Fever	4
Quarter Evil	1
Trypanosomiasis	19 (*T. congolense* 13, *T. vivax* 5, mixed *T. congolense* and *T. vivax* 1).

Stress must again be laid on the value to the farmer of submitting smears from sick or dead animals so that early diagnosis of disease can be established and preventive or curative measures put into immediate practice.

In addition to the above field smears 1,554 smears from animals undergoing redwater and gallsickness inoculation at the laboratory were prepared and examined.

Serological Tests

As B.W.D. testing, which is now obligatory for all poultry breeders selling hatching eggs, chicks or any birds not destined for immediate slaughter, is undertaken by specially trained lay field staff, blood samples or birds are now only tested at the laboratory for purposes of confirmatory diagnosis.

All contagious abortion testing is, however, still carried out here and 10,112 blood samples were received and tested. Infection was detected in 709 samples indicating that this disease was present on 143 different farms. The above number represents a decrease of 2,936 in the number of samples received, probably because so many people are now resorting to vaccination instead of blood testing.

Other Diagnostic Methods

Specimens of various types received for examination totalled 1,059, of which 474 were for rabies diagnosis. The results of examination of these were:—

Rabies	163 histologically and 20 biologically positive.
Contagious Epididymitis	10
Calf Paratyphoid	1
Actinomycosis	1
Skin tuberculosis	1
Internal Parasites	27
Mastitis	24
Arsenical poisoning	32

The tuberculin test was applied on 48 head of cattle received from the United Kingdom for quarantine and redwater and gallsickness immunization.

Postmortem examinations were undertaken on 1,245 head of poultry, nine pigs, one cow, four sheep, one calf and one rabbit.

Scheduled diseases detected in poultry were:—

Coccidiosis	153 cases
Roup	47 „
Fowl Typhoid	19 „
Spirochaetosis	1 „
Chicken Pox	1 „
Fowl Cholera	8 „

There were also 146 cases of tumours, 20 of visceral gout, 21 of worm infestation, one of casesous lymphadenitis and one of aspergillosis.

Previously, very little diagnosis by histological examination of diseased organs, except in the case of rabies, was undertaken, but this diagnostic procedure is now commonly resorted to and will no doubt increase in the future as technique improves and further proficiency in histopathological diagnosis is acquired.

Preventive and Curative Services

Vaccines and Remedies

A further marked increase in the sales of vaccines and remedies must again be recorded. The revenue resulting from these sales, services in connection with immunization of cattle and sales of experimental animals amounted to £10,612, from which some idea of the volume of this work can be gained.

The gospel of prevention of disease is constantly preached as it is certain that only by preventing losses from disease can a flourishing livestock industry be developed and maintained. One important method of ensuring such prevention is by the timely use of vaccine.

Quarter Evil Vaccine

The sales of this vaccine, which is all produced in the laboratory, increased by over 60,000 to 349,024 doses, producing a revenue of £4,448. It is gratifying to note that many farmers who temporarily took to using imported commercially prepared vaccine, in some cases with adverse effects, have reverted to using our Rhodesian vaccine which has so clearly proved its worth in the past.

Horsesickness Vaccine

Users have now become fully acquainted with the use of the freeze dried product, which is the only type now imported, and issues rose by 528 to 4,537 doses. The vaccine continues to afford good protection and if one regards the cost of the vaccine (7*s*–6*d* per dose) as being in the nature of an insurance premium the cost of the annual cover is indeed low.

Redwater and Gallsickness Vaccine and Immunization of Cattle

One might think that after all the years that dipping, and now recently spraying, has been practised, these two tick transmitted diseases should have been brought under such control as to render protective vaccination unnecessary. This is, however, far from being the case and the annual losses from these diseases is still a major factor. As the vaccine is a " live " one, which actually sets up both diseases, albeit in comparatively mild form in the majority of cases, its use by owners continues to be restricted to the more resistant young stock. Where the services of a private veterinary surgeon are readily available this age restriction has been waived in many cases. The policy of issuing the less likely to be fatal gallsickness vaccine, without redwater, was permitted as a trial and seems to have been reasonably successful. Unfortunately, towards the end of the year, the mild vaccine gallsickness strain appeared to have become contaminated with the more virulent natural strain and issues have had to be suspended. The combined vaccine was issued to the extent of 2,471 doses and the single (gallsickness) vaccine 1,160 doses.

A total of 156 head of cattle underwent the full course of immunization in the laboratory stables. Of these, 12 bulls and 77 females were received from the United Kingdom, 27 bulls and 17 females from the Union of South Africa, 17 females from South West Africa and eight bulls were from local sources.

The number of cattle that can be dealt with at a time is governed by available stable accommodation and there have been several occasions when applications to have animals immunized have had to be refused on account of lack of stabling, a position which is aggravated by having to house A.I. bulls separately in one stable unit.

Contagious Abortion Vaccine

Issues of this vaccine have increased by just over a third to 44,715 doses. The vaccine is now for the most part readily available and as it is issued by Onderstepoort in the freeze-dried form, which has far better keeping qualities than the fluid form, small stocks have been held at the laboratory for issue on demand. In spite of this and of the fact that the use of the vaccine is being widely advocated, however, it is apparent that insufficient use is being made of this excellent vaccine to reduce the incidence of abortions due to contagious abortion. It may be necessary to make vaccination of all breeding females compulsory, as it is believed is to be done in the Union, in an all out effort to control this infection and help to build up our cattle shortfall.

Other Vaccines

The following issues of other vaccines were made:—

Anthrax	43,130 doses
Calf Paratyphoid	4,399 „
Lamsiekte	315 „
Enterotoxaemia	1,000 „
Blue Tongue	870 „
Chicken Pox	181,700 „
Fowl Typhoid	13,046 „
Newcastle Disease	100 „

It is now the policy for all Anthrax vaccine to be purchased by this branch, which maintains a small quantity on hand at all times for immediate issue in the event of an outbreak of the disease occurring.

Remedies

Tetram (357 gallons), Blow Fly spray (186 gallons), Nodular worm remedy (1,575 tins), and Dimidium Bromide (160 doses) were sold. In addition many thousand doses of the last-mentioned remedy, for the treatment of trypanosomiasis, were issued free for use in the extensive outbreaks of this disease.

ARTIFICIAL INSEMINATION SERVICE

The professional control of the Artificial Insemination service is entrusted to Mr. D. K. Shone, whose report follows.

The service continues to show a steady expansion. This is evident from the fact that the number of doses of semen sold rose by 1,120 to 3,610 in the year.

Bulls

Friesland

In November, 1953, Schaapkraal Draman, previously in use at Gwebi College of Agriculture, was introduced into the centre as a replacement for Eerstegeluk Aggie IX Bozum who had suffered a mechanical injury to one testicle. This was an emergency measure which unfortunately has had to be continued owing to bull shortage.

In the same month Buff Heikes Jan was returned to Mr. T.C. Pascoe, as he could not be depended on to serve when required and was thus completely unsuitable for use in the centre. The supply of free semen to Mr. Pascoe was thereupon discontinued.

Eerstegeluk Aggie IX Bozum was sold as he was returning to his daughters and because of the injury referred to above. A chronic leg injury also made him undependable for regular use. He had been in the service since its inauguration in December, 1948.

Came Gerards Beme continues to give good service, though increasing sluggishness has become evident, probably through the continuous use that has had to be made of him since his introduction in December, 1952. Since that date 110 collections have been made from him.

Three further Friesland bulls were introduced into the centre but have so far proved unsatisfactory for general use.

Jersey

A second Jersey bull, Doringlaagte Daydream Parmant III, was made available by the Jersey Association for use at the centre. This has overcome the lapses in the supply of semen which occurred previously, but regrettably the demand for Jersey semen remains disappointingly low.

Fairseat Volunteers Pacifier II has, except on a few occasions, given good semen throughout the year.

General

During the course of the year a special ration with a high protein value was formulated and at the same time the bulls were tethered outside in paddocks (three to four to a paddock) and stabled at night. Since these measures have been introduced none of the bulls has failed to serve except where an injury or infection of the feet has occurred. The bulls continue to remain sluggish, though an improvement did result when the time of collection was altered from the morning to the afternoon. It was also noted that the bulls became keener when the teaser cows were changed, especially if one of a different colour was substituted.

Semen

In general the semen quality has been of consistently high quality and with rare exceptions it has been possible to meet all demands for semen from the bulls at the centre. On those occasions when semen had to be collected from a bull at the Gwebi Agricultural College it was due to either a sudden increase in the demand for semen or low dilution due to poor quality of the ejaculate.

The dilution of the Friesland semen has been progressively increased to meet the growing demand and dilutions of up to 12 and 15 are now the rule.

A 3.92 per cent. sodium citrate solution containing 0.6 per cent. sulphanilamide, prepared at the laboratory, is now in use. Penicillin and streptomycin are added to the egg yoke citrate diluent at the rate of 500 and 300 units per cc. respectively.

In order to eliminate the possibility of confusion in identifying any bull's semen, four different coloured rubber caps are now in use for capping the test tubes. Semen from each bull is denoted by a specific coloured cap.

The type and size of the semen test tubes has now been standardized; the number of doses held by a tube and the number of doses on hand can thus be readily determined.

Semen Used by Inseminator

One thousand eight hundred and ninety-eight inseminations were performed and a total of 30,334 miles covered, an average of 15.98 miles per insemination. In the last four months over 3,000 miles a month have been covered.

Considerable difficulty has been experienced with the transport available. An Austin A40, primarily intended for this service, has proved too light and small for the mileage undertaken and is constantly having to undergo repairs. Attempts to arrange a replacement with a more suitable type of vehicle have failed. At times three cars had to be held in readiness for this service, as while one was in use the other two were undergoing service and repairs.

Semen Other than that used by the Inseminator

The Bulawayo sub-centre was operated by the District Veterinary Officer with semen flown from Salisbury and has shown a steady increase in its demands for semen. Other areas in which semen is used by the farmer or private practising veterinary surgeon are Salisbury, Norton, Hartley, Gatooma, Eiffel Flats, Marandellas, Rusape, Umvukwes, Bindura, Concession, Darwendale, Mazoe, Glendale, Banket and Shamva.

A total of 559 doses was used or issued by the Bulawayo Veterinary Office and 1,000 doses were supplied to other areas.

In order to improve the supply of semen to outside areas, the twice weekly semen collections were altered to Wednesday and Sunday afternoons. Previously, when the collections were made on Monday mornings, no semen would be available for use in the outside areas until Monday evening or Tuesday morning. This has been an important contributory factor to the growth of this side of the service. It is therefore now possible to have semen available in all areas from Umtali in the east to Bulawayo in the west at the same time as it is available for use in Salisbury.

Breakages of thermos flasks, transported by rail, have been largely overcome by (*a*) the use of wide-mouthed, pint thermos flasks in which the ice and test tubes are packed in a canvas packet, thus preventing their direct contact with the glass liner; and (*b*) by packing the flasks in wooden boxes lined with half inch thick sponge rubber.

Records

Many pregnancy examinations were performed on cows inseminated by the inseminator in order to determine the actual conception rate, as, due to the method of charging for the service, it is not possible to compute this with any degree of accuracy by the non-return method.

The overall conception rate was 79 per cent., of which 50 per cent. were in calf to the first insemination, 20 per cent. to the second and 9 per cent. to the third insemination or more.

The conception rates on different farms varied from as low as 5 per cent. up to 95 per cent. No definite reason can be given for this variation, though it is probably associated with a number of factors such as, management, feeding and the breeding capabilities of the cows.

It has been noted that where artificial insemination is first used on a herd the initial results are usually poor.

This is probably due to the fact that the good breeders are already in calf or have just calved down and the majority of cows presented are the more difficult breeders. At times farmers present cows which have failed to hold to the bull, in the expectation that artificial insemination will settle them, and they use this information to judge the value of artificial insemination.

It is gratifying to note the increasing use made of artificial insemination by those farmers whose herds are infected with contagious sterility. It has been found that the conception rates attained in herds which have long been infected, but from which the sterile cows have been removed, compare very favourably with those obtained in clean herds.

Two examples of the satisfactory conception rate in infected herds are:—

Herd A. Thirty-eight inseminated, 30 in calf; conception rate 76.3 per cent.
Herd B. Sixty cows inseminated, 40 in calf; conception rate 65.5 per cent.

In one or two herds infected with contagious sterility the owners continue to make use of bulls in addition to artificial insemination. This is greatly to be deplored as the advantages gained by the use of artificial insemination, *viz.* prevention of spread by eliminating the bull, are nullified.

Instruction in Artificial Insemination

A further number of short courses on artificial insemination were given to farmers. The course includes instruction in collection, dilution and storage of semen as well as in the technique of insemination.

One serious drawback is that only a limited number of cows are available on which the trainees can practice.

The conception rates obtained by farmers doing their own inseminations vary considerably in accordance with the individual's proficiency in performing the insemination.

As a result of these courses the number of farmers doing inseminations with semen obtained from the centre has increased. A few also collected semen from their own bulls.

Details of Semen Supplied:—

Used by the Inseminator	1,812 doses
Issued to the District Veterinary Officer, Bulawayo	559 ,,
Issued to farmers and Veterinary surgeons	1,160 ,,
Used on government animals	86 ,,
TOTAL	3,617 doses

Number of doses of Friesland semen	3,225
Number of doses of Jersey semen	385
TOTAL	3,610

Details of Mileage Covered:—

Inseminating Government animals	1,128 miles
Inseminating on 'Epi-vag' quarantined farms	15,138 ,,
Inseminating on clean farms	14,068 ,,
TOTAL	30,334 miles

Average mileage per insemination 15.98 miles.

Revenue:—

	£ s d
3,438 doses of semen	2,556 10 0
14,068 miles at 1s per mile	703 8 0
Railage on semen despatched	26 13 10
TOTAL	£3,286 11 10

Details of Semen Collections

Frieslands	*Total semen*	*No. of Ejaculations*	*Average volume of Semen per Ejaculate*
Came Gerards Beme	375.5 cc.	74	5.07 cc.
Schaapkraal Draman	410.5 cc.	52	7.89 cc.
Gwebi Adema	30.0 cc.	6	5.00 cc.
Eerstegeluk Aggie IX Bozum	33.0 cc.	4	8.25 cc.

Jerseys	*Total Semen*	*No. of Ejaculations*	*Average volume of Semen per Ejaculate*
Fairseat Volunteers Pacifier II	223.0 cc.	80	2.78 cc.
Doringlaagte Daydream Parmant III	59.5 cc.	26	2.28 cc.

Experimental Work on Deep Freezing

Before commencing experiments with deep frozen semen it was necessary to determine the best method of storage of dry ice to ensure the longest keeping period with the minimum amount of dry ice. This was essential, firstly, because supplies of dry ice were available in Salisbury twice weekly only, and non-arrival of a shipment could thus result in complete failure, and secondly, as the dry ice was imported from the Union of South Africa the landed cost was very high.

Comparative trials were run by holding the solid CO2 in thermos flasks at room emperature and at 4°C in a refrigerator. The dry ice in the flask stored at room temperature lasted approximately two days while that at 4°C lasted three and a half days.

The keeping period was extended to eight days by sinking a thermos flask liner in a block of expanded ebonite and holding this at 4°C. When this knowledge had been obtained it was decided to proceed with deep freezing trials.

The equipment necessary to ensure controlled cooling of the semen was made from a polythene mug and a metal tablet container and proved very satisfactory.

Three semen deep freezing trials were undertaken with the following results:—

Trial 1

Semen was collected on the 17th May and deep frozen the same day. The estimated recovery rate on thawing was 30 to 40 per cent. Cow No. 105 was inseminated on the 19th May and proved to be pregnant when examined on 14th July.

Trial 2

A further lot of semen was collected and deep frozen but due to error in the cooling process proved on thawing to be non-viable.

Trial 3

Semen was collected on 25th June and deep frozen the same day. Recovery on thawing was estimated at 10 to 15 per cent. in one ampoule, but in other ampoules examined was estimated at 50 to 60 per cent.

After 20 days storage this semen was used to inseminate cow No. 80 and after 22 days cow No. 120. Both cows have now been confirmed as being in calf.

There are at present many practical difficulties which make it impossible to undertake deep freezing of semen as a regular procedure here, but it is confidently expected that these will be overcome in the near future.

INVESTIGATIONS AND RESEARCH

Under this heading are included subjects on which special investigations have been made, even although in some instances they are connected with diagnosis or treatment of disease. For example, in the sections on rabies and epi-vag, compiled by Mr. G. J. Christie, diagnostic details of cases dealt with are recorded and the section on infectious coryza and pig paralysis, written by Mr. J. H. Darbyshire, deals with trial treatments and attefpts to diagnose the cause of the complaints.

Rabies

Material from 414 suspected cases was submitted to the laboratory for diagnosis during the year. Of these 183 proved positive, 163 on histological examination and 20 on biological test although they were histologically negative.

Analysis of the 183 positive cases shows that 27 were in vaccinated and 118 in non-vaccinated dogs. Of the former, 20 were European and two African-owned, the other five being African type strays, whereas of the non-vaccinated dogs 25 were European and 20 African-owned, 72 were African type strays and one was a European type stray.

Of the 20 cases, which were biologically positive though histologically negative, two were humans, one was a cat, one a jackal, one a pig and 15 were dogs. Thirteen of these dogs, including four which had been vaccinated, the cat and the jackal were shot and this fact probably accounts for their being histologically negative, destruction having occurred before Negri bodies had formed.

The technique of diagnosis used previously was still found to be satisfactory and no major changes were made, with the exception of the increased use of the biological test.

The biological test is now made:—(*a*) on all cases in which the histological examination has proved negative but there has been human involvement, (*b*) on certain vaccinated dogs, especially those that have been vaccinated more than once, (*c*) to confirm the diagnosis of the disease in a new area or an area previously covered by vaccination and in wild animals, and (*d*) on all human cases where the histological examination has been negative.

The period allowed for a biological test is 30 days. It is of interest to note that, whereas during a vaccine viability check the mice show symptoms between six and eight days, biologicals from field cases usually take 10 to 14 days. We have had at least two cases which took 17 days before producing symptoms in inoculated mice, but this is well within the limit of the 30-day test period.

We have recorded in previous years at least two cases in which a positive histological result was not confirmed biologically. This was thought to be a combination of the time lapse between the two examinations and the temperature to which the material was exposed during transport. The possibility of auto-sterilization was also considered and several trials have been carried out when material was made up for mouse inoculations, portions being retained in an incubator and refrigerator before use. It was shown that there was a definite delay of two or three days in the appearance of symptoms in this retained material as compared with that inoculated immediately. This was thought to be due to viralantibody union, with consequent reduction in viral content of the inoculating fluid.

Breakdowns

During the year we have confirmed the presence of rabies in 27 vaccinated dogs comprising:—

Fourteen vaccinated six months or more,

Two vaccinated between three and six months,

Eleven vaccinated less than three months.

The number of cases in dogs vaccinated over six months is extremely worrying and we have been endeavouring to explain these failures. In the large majority of cases the diagnosis has been established by biological as well as histological means. There are several possible explanations of these breakdowns and we are at present investigating two of them, *viz.*—

(i) *Viability of the Vaccine*

All the vaccine used has been obtained from a commercial firm in the U.S.A. and is made from a well-known avianized strain. As soon as each batch is received it is tested for viability. Although the vaccine is tested in dilutions of up to 1 in 10,000, the 1 in 100 dilution is accepted as being critical. So far, all batches tested have been shown to be lethal for three-to four-week old mice at that or greater dilution.

Vaccine is always stored at −48°F prior to despatch to the various districts. While it is not possible to avoid returning some vaccine to Cold Storage after a day in the veld, it is rare for the vaccine to have been exposed to a temperature of more than 100–109°F. This comparatively brief exposure is not considered significant in view of the fact that the manufacturer's tests show that the vaccine is still viable after exposure at 37°C for seven days.

Records of the batches used during vaccinations are kept so that a batch can be re-checked if necessary, such re-check preferably being made on material that has actually been issued for use at the centre where the breakdown has occurred.

The manufacturers state that after reconstitution the vaccine should be used within two hours. Tests are being undertaken during April, July, October and January to compare the viability of the vaccine at 0, ½, 1, 2, 3, 5, 6, 24, 48 and 72 hours after reconstitution. As far as they have gone these tests show that the period of effective use after reconstitution could, if necessary, be extended considerably beyond the limit given by the manufacturers.

(ii) *Administration of the Vaccine*

The majority of our vaccinations are now undertaken by lay staff. Every effort is made to see that the technique is kept up to standard in view of the fact that the immunological response to subcutaneous injection is not so good as that following intramuscular injection. In the rush, however, of a vaccination campaign it is recognized that the injection may be done hurriedly and therefore possibly not as correctly as it should be. We know, however, of four of our 27 positive cases having being vaccinated on at least two occasions and it is extremely unlikely that poor vaccination would occur on an individual dog more than once.

Where a positive case occurs in a vaccinated animal we endeavour to obtain serum samples from animals vaccinated immediately before and after it and to check these sera, by means of the serum neutralization test, for antibody content. So far we have found an extremely varied antibody response to vaccination, some animals showing practically no antibodies even in undiluted serum while the sera of others protects in 1/100 dilution.

We have not checked enough vaccinated dogs to be able to draw any conclusions on this point. Investigations into the breakdowns are being continued.

During the year we have diagnosed rabies in one European and six Africans and in all cases contact with a rabid dog has proved to be the source of infection. The incubation period has extended from 28 to 90 days.

Our present procedure where there is human involvement is to refer the contact to his doctor. In such cases we advise that the suspected dog should be tied up rather than shot, in order quickly to establish the necessity or otherwise of the person's undergoing a course of injections.

The addition of seven isolation kennels to those already at the Laboratory has proved extremely useful for isolation and control of suspects. In the past year we have detained 51 suspected cases for periods of 7–10 days.

Several of the staff have undergone protective inoculation, following dangerous contact, and we have been able to test the sera of two who were vaccinated 12 and 18 months previously. Their sera was shown to be protective through a dilution of 1/100 against 200 L.D.50 doses of virus. In the absence of a standard virus, the vaccine was used for these serum neutralization tests.

Contagious Epididymitis and Vaginitis

Gwebi Epi-rag Station

Two further blocks of isolation stables have been added to the Station, each capable of holding ten cattle.

We have been retaining all uncastrated male calves born in the laboratory-herd and these are being removed to Gwebi for male transmission tests as soon as they have reached a suitable age. This supply of male experimental animals is very necessary. We get suspected cases in females which can be transmitted to other females per vaginam, producing vaginitis and pus, but the lesions found and the history of the suspected herd are such that it is difficult to give a definite diagnosis—the use of young susceptible bulls in these cases is of considerable assistance.

The stock at Gwebi has been used for diagnostic and immunity experiments throughout the year. Artificial insemination is always used on the station and all calves born are retained there for experimental purposes.

In September, 1952, ten infected heifers were purchased from a local farm. Up to the present, five have calved down and two of these are in calf again, two are in calf for the first time, two have never calved and are clinically normal and the remaining animal is a non-breeder, due to cystic fallopian tubules and is still showing vaginitis and pus.

Immunity Tests

The field staff are co-operating in the collection of fresh, infective material which is being used at Gwebi to study vaginal immunity.

A continuation of the tests, commenced last year, has established that the local, vaginal immunity is extremely short lived. Even though an animal has recovered only a short time previously from vaginitis, it is possible to produce a similar type of reaction by the introduction of infective pus, although, generally speaking, the duration of the condition is shorter in the case of re-infection than was the case in the original infection. This fact is believed to be due to poor vaginal immunity and not differing strains of the virus.

Observations in Infected Herds

In association with members of the field staff we have maintained regular examinations of certain infected herds throughout the year.

It is noted that, generally speaking, the results of artificial insemination for the first three months are extremely poor—once the hard core of returning animals has been settled, however, there is a considerable improvement in the conception rate.

We have found that following recovery from this disease we get a percentage of animals which, though clinically normal, requires from six to ten inseminations before becoming pregnant. This is possibly due to undetected microscopic changes in the genital tract.

A rectal examination is always undertaken as well as a speculum check and the farmer is advised that all non-breeders should be eliminated from the herd once their milk production has become uneconomic.

Where such animals are retained and no isolation practised we find the condition extremely slow to clear up, in spite of the use of artificial insemination.

Several infected herds have shown good records to artificial insemination from the commencement—this is thought to be due to the fact that the disease was diagnosed early and control measures instituted before it had become widespread.

There appears to be a considerable variation in the virulence of different strains of this disease. In some herds the number of sterile cows is small, while in others it is considerable. We have one instance of mild infection in a herd with little sterility, but the introduction of positive animals from another herd increased the sterile animals to quite a high proportion.

We appear to be finding an increasing amount of infection in young stock which has not been served. Recovery appears to take place within a reasonable period, a few months usually, without palpable fallopian tubule lesions, but it is still possible that these animals will show the secondary lesions after the first pregnancy.

Abbatoir Material

Available material from slaughtered animals out of infected herds is still being examined at the laboratory. The lesions found are always confined to the ovaries, fallopian tubules and the vagina, with an occasional case showing pleurisy and peritonitis. It is often difficult to see the vaginal lesions after death, in spite of the fact that they are quite noticeable ante-mortem.

The Epi-vag position is becoming increasingly complicated, firstly, because of the difficulty of establishing a definite diagnosis, and secondly, owing to our inability to state with assurance that an infected herd has cleared up.

Diagnosis

In the male the diagnosis is relatively easy as compared with the female. It must always be accepted that this is a herd condition and not a condition of the individual animal. In the majority of suspected cases in the individual male a diagnosis can be given, but it is not possible to establish a diagnosis of Epi-vag in an individual female showing vaginitis and pus—a herd check must be undertaken. While it is not difficult to give a diagnosis in cases where both males and females show typical lesions, it becomes almost impossible to give a diagnosis in the absence of lesions in the male and the presence of only pus and vaginitis in a few of the females in a herd. To date it has not been possible to lay down a minimal list of lesions on which a diagnosis can be given.

The situation is also complicated by the presence in some bulls of a factor which causes a temporary vaginitis with pus in females served by them. This condition which appears within two days of service lasts eight to ten days but does not cause sterility and is not thought to be of any importance, except as an added difficulty in the differential diganosis of Epi-vag.

One local herd has shown a condition in young stock—mostly virgin—which consists of marked vaginitis with considerable pus formation. Some of the animals affected are only about six months of age. The history of the outbreak suggests indirect transmission. No infertility has yet been recorded in this herd. Animals have been removed to Gwebi Epi-vag station and the condition reproduced there in susceptible but considerably older stock. At present we are removing newly born calves to isolation at the laboratory and these will be subjected to periodic checking.

Control

Artificial insemination is of the greatest help in controlling this desease and all farmers are advised where possible to use this method. The expansion of the artificial insemination service in the country has accordingly been considerable. Semen is being despatched by rail and air to various centres in the Colony.

An important point, not thoroughly appreciated by the farmer, is isolation of clean stock from dirty—this must be done in view of the fact that indirect transmission does definitely occur.

Until a herd has completely cleared up, these two factors in control must be applied. Several farmers have had a recrudescence in their herds by introducing fresh animals before the infection had completely died down.

Conclusion

The seriousness of this condition is such that we suggest at least one Veterinary Officer be employed full time into investigation, with emphasis on diagnosis and

control. The definite diagnosis of Epi-vag is extremely important in view of the presence in the Union of South Africa and the United Kingdom of at least two other diseases causing infertility, namely trichomoniasis and vibrio foetus infection. So far these conditions have not been diganosed in this country.

Agalactia in Pigs

This condition, characterized by sows showing complete or almost complete lack of milk at farrowing, first made its appearance in July, 1953, and for a few months was responsible in both the Fort Victoria and Umtali Districts for the death, through starvation, of probably well over 1,000 piglets. Extensive investigations were carried out by the district staff, in consultation with this branch, in both districts and the evidence collected pointed so strongly to the condition being associated with a particular diet that it was decided to carry out research on dietary lines.

Experiments were planned to determine, if possible, the actual responsible ingredient or factor in the diet, and, in order to eliminate the possibility of some local climatic or other conditions also playing a part, it was decided that the experiments should be conducted in three different parts of the country, *viz.* Fort Victoria, Salisbury and Bulawayo.

In order not to complicate the picture too much or to introduce so many variables as to render the experiments too unwieldy, one proprietary pig ration, which was under the greatest suspicion because of the frequency with which agalactia developed following its use, was selected for intensive investigation. The composition of this ration, which will be referred to as "Ration A", was willingly disclosed, in fact it must here be recorded that the firm making it afforded every assistance and co-operation in our endeavours to trace and eliminate the casual factor. Three individual ingredients of Ration A were selected for critical trial as being the most likely to provide an answer. These were meat and bone meal, fish meal and munga meal and feeding trials were accordingly designed with the object of determining whether or not any one of these was responsible.

In any such experiments it is essential to have positive and negative controls. For the former, Ration A was used and for the latter were used (*a*) at Fort Victoria, a ration made up of maize meal 85 per cent., groundnut cake 15 per cent., plus minerals, and (*b*) at Salisbury and Bulawayo proprietary rations normally fed there without adverse effects.

The Bulawayo trials went no further than using Ration A and the negative control ration, whereas those at Fort Victoria and Salisbury included the three "unknowns". These "unknowns" consisted of:—(1) the "Munga" Ration, composed 35 per cent. maize meal, 50 per cent. munga, 15 per cent. groundnut cake plus minerals, (2) the "fish meal" ration, composed of maize meal 85 per cent., fish meal 15 per cent. plus minerals and (3) the meat and bone meal ration composed of maize meal 85 per cent., meat and bone meal 15 per cent. plus minerals.

At both Fort Victoria and Salisbury two sows were used in each group. Unfortunately, one of the sows in the positive control group, *i.e.* on Ration A, at Fort Victoria proved not to be in pig, but the other one, which originated from a farm where there had been no agalactia trouble, farrowed down 14 piglets and developed typical agalactia which lead to the death of the piglets within 48 hours. No cases of agalactia developed in any of the other groups.

At Salisbury, where facilities were very kindly made available by Dr. Calder of the Pig Research Board, one of the two sows in the positive control group, *i.e.* on Ration A, farrowed seven piglets. This sow had no milk, *i.e.* typical agalactia, and the piglets were removed for hand-rearing. The second sow in this group farrowed 11 piglets and had ample milk for them. All sows in the other groups farrowed and reared their piglets normally.

From Bulawayo, where the feeding trials were kindly run by the Rhodes Matopos Estate, the results are completely unreliable, as two of the negative controls lost their litters within a few days and the third only reared five out of a litter of 19, seven of which were stillborn. In the positive control group, *i.e.* on Ration A, only two of the three sows farrowed—one had a litter of five, all of which died within 48 hours through the sow's having no milk and the other a litter of ten which did well.

Analysis of the results of the more detailed Salisbury and Fort Victoria experiments can only lead to the conclusion that Ration A did lead to two out of three possible sows developing agalactia, whereas none of the other rations produced any abnormality. Thus, neither the munga, the fish meal nor the meat and bone meal fed in these cases was the factor responsible for agalactia.

Very careful examination of the records of the fish meal and the meat and bone meal used in the preparation of various batches of Ration A, when considered in conjunction with the appearance of agalactia in pigs receiving these different batches, has suggested the possibility that only certain lots of meat and bone meal contain the

factor responsible. This possibility is under further investigation. The feeding of Ration A at Salisbury is also being repeated. Here too it must be recorded that the sow which developed agalactia, following Ration A feeding, has farrowed down again and remained normal. following feeding on the negative control ration.

While these feeding experiments were under way various analyses of the food components and of the blood from the sows were kindly undertaken by the Chief Chemist but yielded no results which could be regarded as significant.

Paralysis Condition in Pigs

Three pigs were forwarded to the laboratory from Fort Victoria District for investigation. All pigs showed recumbency, disinclination to move and adoption of a kneeling posture.

Blood was removed from the anterior vena cava of one pig, analysed and compared with blood from a normal pig. The only significant difference was a low inorganic phosphorus content in the sick pig.

One pig was placed on calcium therapy, one on liver extract injections and the third acted as the untreated control.

The pig given liver extract recovered most quickly but, in fact, all the pigs recovered normality within a few days. No conclusions can be drawn from this, other than that some dietary factor was responsible, possibly resulting in a Calcium, Phosphorus imbalance.

Pig Anaemia

As it has often been noted that blood smears of apparently normal adult pigs show an anaemia to a greater or lesser degree it was decided to check the blood of pigs at weekly intervals from birth to slaughter or one year of age in all possible aspects.

The blood used was venous blood obtained directly from the anterior vena cava, bleeding for peripheral blood from the ear veins being discarded as unsatisfactory. Blood preservative used was double oxalate (*i.e.* ammonium and potassium oxalates at the rate of two and three mgs. per cc. of blood respectively). The investigation which has been interrupted, and for various reasons beyond our control temporarily discontinued, covered the following points:—

1. Blood clotting time.
2. Haemoglobin estimation in grams per 100 cc. of whole blood evaluated on an M.R.C. Grey Wedge photometer.
3. Sedimentation rate.
4. Packed-cell volume.
5. Fragility index.
6. Red blood cell count.
7. White cell differential count.
8. White cell count.
9. Mean red cell diameter.

The experiment embraced two litters of pigs taken at birth at Gwebi College. Due to the non-completion of the experiment no conclusions can be given at this stage. One interesting point has emerged and this is the great drop in the haemoglobin content at weaning, which followed a gradual rise from the maximum fall at about ten days old. Anaemia can be stated to be definitely present in sty-run piglets in those investigated, but compares favourably with the "normal anaemia" one gets in piglets in the United Kingdom. Sixteen piglets were used in all in this experiment. Further work on this subject will be resumed at as early a date as possible.

Balantidium Suis

This protozoan parasite has been regarded as practically a normal inhabitant of the large intestine of the pig. We have, however, had several cases of diarrhoea with loss of condition reported in young pigs, which appeared to be associated with massive infestation of the caecum and colon by it.

The lesions found were a marked inflammatory condition, with small necrotic foci which on squash preparation proved to contain very large numbers of the parasite. So far we have failed to transmit the infestation to healthy pigs so that it is possible there is a trigger factor missing.

Enteritis in Swine

We have recorded sporadic cases of enteritis in fattening and breeding pigs, the etiology of which is at present unknown. It is thought to be associated with a clostridial type of organism, but so far we have been unable to produce the condition in experimental pigs which were heavily dosed with bowel material from infected pigs.

Spraying for Tick Control

From the time when it was first appreciated that the extremely valuable, almost non-toxic, newer synthetic insecticides, *viz.* D.D.T., B.H.C. and Toxaphene deteriorated in dip tanks, resulting in a loss of biological efficiency against ticks, it was realized that their application in the form of freshly made up spray was the only likely method of overcoming this defect. The practical difficulties of operating a power-operated, walk-through type of spray in such a way as to ensure adequate wetting of the cattle, which is so essential for proper tick control, were very obvious.

A commercial type of spray-race was erected in greatly modified form and in such a way as to enable further modifications to be effected comparatively easily. Much time and thought has been devoted to improving the efficiency of this unit and it is gratifying to report that considerable success has been achieved. The old and well proved method of securing tick control by means of dipping in an arsenical dip wash has now given way on this station, for all time I believe, to that of power spraying.

Several visits have been paid to farms to see certain commercial spray-races in operation and much discussion has taken place with the local representatives and the Union manufacturers of such races in an attempt to have improvements effected. These discussions have been so fruitful that it can be said with confidence that the most recent models represent a great advance on the old types, in so far as efficiency and simplicity are concerned.

Although perfection of the fixed type of spray-race has not yet been accomplished it is felt that the time is now ripe to develop portable races and this matter is already receiving attention.

Drug Treatment

Trials were undertaken with various new drugs on naturally occurring cases of various diseases in this vicinity.

Fairly extensive trials with one new drug in the treatment of sweating sickness have yielded inconclusive, though promising results. Many of the affected animals treated appeared to respond quite spectacularly, but others showed little or no response. It is always difficult and misleading to assess the therapeutic value of any drug in a disease such as sweating sickness in which the virulence of infection is so variable.

The use of antibiotics in a case of calf diphtheria was again tried, but it can only be stated that the animal recovered.

In anaplasmosis two, and in trypanosomiasis one, new drugs were given a trial but again no conclusions could be drawn.

Fowl Coryza Experiments

Fowl coryza experiments were initiated as a direct result of a widespread occurrence of respiratory disease in the Salisbury District.

The experiments were of two types, *viz*,—

1. To assay various methods of treatment then in vogue on birds suffering from fowl coryza.

2. To determine whether the infective agent was viral or bacterial. The possibility of avitamonosis A being responsible was covered in the first part of the experiment.

The first part of the experiment consisted of dividing ailing birds into groups, including a control group which was left untreated. The other groups were treated individually with 50,000 units of penicillin intramuscularly daily and in another section of the experiment intratracheally at the same dosage rate.

Treatment lasted for four days in each case. Another group was treated with sulphadiazine and also with sulphadiazine plus cod liver oil by mouth. The results of this part of the experiment revealed little or no change in the birds in all groups, excepting that the penicillin treated groups lost less weight over the experimental period. Evidence was thus inconclusive, especially in view of the small number of experimental birds involved. If anything, the penicillin birds responded better than the sulphadiazine treated ones.

It should be noted that the proprietary brand of "Avisol" is now named as the drug of choice for treatment of fowl coryza and appears to be effective. No experiments involving the use of this drug have been done to date.

The second part of the experiment consisted of dividing healthy susceptible birds into groups and infecting them artificially by different routes with suspension of ground-up lungs in saline, treated and untreated with penicillin and streptomycin in

combination. In effect, the latter procedure gave a suspension free of bacteria but not of virus (if present) and another suspension containing both possible virus and bacteria.

Routes of inoculation included intramuscular and intranasal methods. All groups were strictly isolated from one another. The therory of the experiment was that if all birds in all groups developed the disease the causal agent was a virus being common to both suspensions. If only birds in the groups receiving the untreated suspe nsion developed the condition then the agent was a bacteria. The suspensions were checked for bacterial growth on blood agar with no definite results.

Results of the experiment gave one or two birds throughout all groups responding to infection temporarily. The transient reaction and the small number of experimental birds made it clear that the condition was difficult to reproduce under experimental conditions of airy, well-ventilated pens. The tentative conclusion is that the causal agent is probably a virus.

Miscellaneous

Veterinary Short Course

In 1953 a veterinary short course was given to farmers following a request for such by the R.N.F.U. That one, as was previously recorded, proved so popular that this year we were asked to permit the attendance of greater numbers at the course or, alternatively, to run more courses. The latter idea was not possible of adoption, owing to the disruption of the laboratory work which would inevitably follow suspension of activities while the professional staff's time was taken up with lectures and demonstrations.

However, as a result of the facilities very kindly afforded us by the Education Department, whereby those attending the course could be accommodated at a hostel at Prince Edward School and attended lectures in the school's Beit Hall, the R.N.F.U. was informed that a total of 55 persons would be accepted.

These arrangements proved eminently satisfactory, owing to the proximity of the school to the laboratory. There was a definite saving of travelling time by the lecturing staff, and the staging of demonstrations at the laboratory was far easier than at Gwebi, where the course was previously given. The course was held over the five days 30th August to 3rd September and was attended by 37 people of whom ten lived out.

Complete satisfaction with the instruction given and with the food, accommodation and amenities provided, for which special thanks are due to the Headmaster, Mr. Slaven, was expressed by all and there would appear to be no doubt that similar courses will have to be given at least annually.

Visits to Conferences

Visits were paid by the Assistant Director to Pretoria in March to consult with the Union Veterinary Department Officials on the untimely reappearance of East Coast Fever in the Chipinga District, to Nairobi in July to attend meetings of the Council of Management of I.B.E.D. and the inaugural meeting of the InterAfrican Advisory Committee on Epizootic Diseases, and to Pretoria in September as a delegate to the International Scientific Committee for Trypanosomiasis Research. The contacts made at such meetings are invaluable.